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Volume XIV
January-June, 1912

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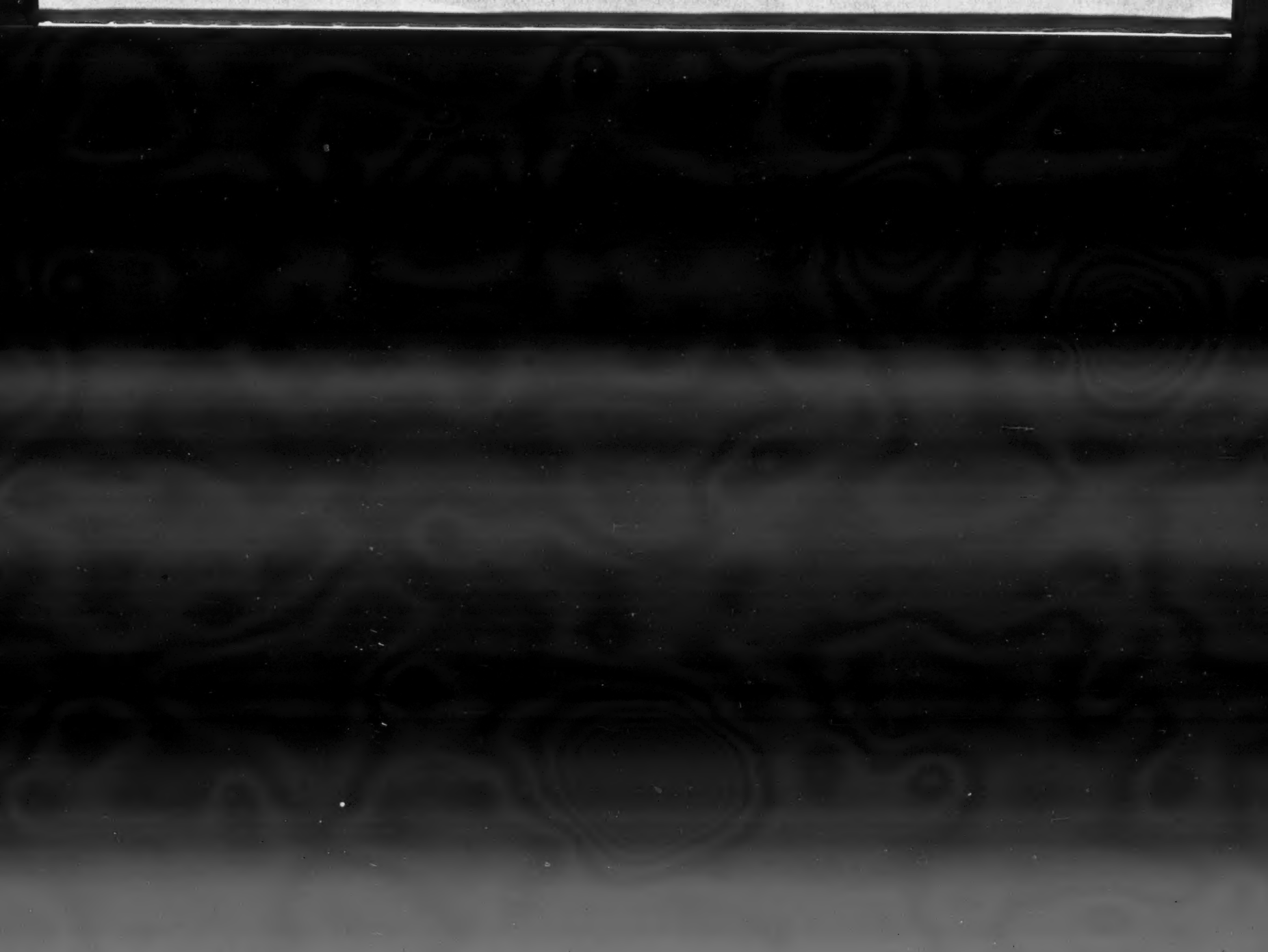

ANNUAL SUBSCRIPTION: UNITED STATES AND CANADA, $5.00; FOREIGN, $6.00 (25 SHILLINGS)

Volume XIV JANUARY, 1912 Number 1

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The Surgical Clinics

of

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SURGERY, GYNECOLOGY AND OBSTETRICS

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VOLUME XIV JANUARY, 1912 NUMBER 1

ARTERIOVENOUS ANASTOMOSIS IN THE TREATMENT OF GANGRENE OF THE EXTREMITIES

BY ALBERT E. HALSTEAD, M. D., AND ROGER T. VAUGHAN, M. D., CHICAGO, ILLINOIS

THE application in clinical surgery of the experimentally successful procedure of reversal of the circulation in the arteries and veins has been proposed as a means of treatment of conditions which have for their underlying cause a failure of the arteries to perform their function of conveying red blood to the tissues.

Although animal experiments have shown that it is possible to transfer the circulating arterial blood to a corresponding vein, this does not prove that this experimental feat can be successfully employed in the treatment of conditions resulting from a defective blood supply which follows occlusion of the artery from disease, or destruction of the same as a result of trauma.

The great possibilities of this procedure were early recognized by clinical surgeons. Since the early experiments of François Franck, in 1881, many have attempted to produce a satisfactory arteriovenous anastomosis in animals. It remained for Carrel, in 1902, to perfect the technique of vascular experimental surgery, and to make the first satisfactory anastomoses. The failure of the early experiments was largely due to faulty technique, and it may be said that it is largely the splendid work of Carrel that has led the operating surgeon to attempt to apply in clinical surgery the procedure which he has demonstrated as possible in animals. However, the value of arteriovenous anastomosis cannot be fixed by experimental data alone. Its place in surgery can only be determined by actual clinical experience. For this reason we have collected all of the available cases published, and, in addition, have added a number of cases, including two of our own. From an analysis of these we hope to secure data that will permit us to place this procedure in its proper relations, and determine its value as a practical surgical measure.

The indications for arteriovenous anastomosis are chiefly in cases where, as a result of occlusion of an artery, it becomes necessary to transport arterial blood by way of the veins to the capillaries. This obstruction of the circulation through a principal artery, leading to ischemia of the parts supplied with blood through that artery, results generally from some disease by which the artery gradually becomes obliterated, or from the stoppage of an artery by an embolus, or from destruction of an artery by trauma. In all of these conditions arteriovenous anastomosis has been tried, with a hope that by substituting the vein for the artery below the point of obstruction an adequate supply of red blood might be furnished, and thus prevent death of the parts below.

Experimental work on animals has played a large part in the development of a practical working technique in all vascular surgery. For this reason a brief review of the experimental work done, in perfecting the operative

procedure now under consideration, seems to be essential before the clinical aspects are considered.

HISTORICAL REVIEW OF EXPERIMENTAL WORK ON ARTERIOVENOUS ANASTOMOSIS

While experimental and clinical suture of veins dates back about as far as venesection, and while suture of arteries was already successfully practised in 1759, anastomosis of the two does not seem to have been attempted until 1881. In this year François Franck performed an arteriovenous anastomosis of the femoral artery and vein on dogs in attempting to make an arteriovenous aneurysm. He first tried inserting the Graefe knife into the femoral vein by way of one of its collaterals, and then slipping it through the other wall of the vein and then into the artery. This procedure resulted in a profuse hæmorrhage at the site of the operation, but not in the production of an aneurysm. Therefore, he next proceeded by baring both vessels of their adventitia, laying them in apposition, and closing the wound. After waiting sufficiently long for the vessels to become well adherent, he reëxposed them and passed the knife in the same way, with the result that the arterial blood flowed into the vein, which pulsated markedly, and a tracing was obtained with the sphygmograph which resembled the usual pulse tracing.

This was a matter of some scientific interest, but of no apparent practical value at that time, and was not even reported by Franck until 1896.

No further experimentation in this direction seems to have been attempted until Raymond Petit attacked the problem in 1896. In this year, among other experiments on the arteries and the veins, he twice did a latero-lateral suture of the femoral artery and vein in dogs, both of which cases ended in a fatal hæmorrhage. In the second case the artery broke in two. He also demonstrated the useful fact that loose strands of catgut inserted into the lumen of the vein could become resorbed without producing clotting. His venous anastomoses were, however, more successful than his arteriovenous.

In 1898 Gluck was successful in transplanting a piece of the carotid between the two cut ends of the jugular vein, and also a piece of the jugular vein between the two cut ends of the carotid. He used a circular suture, and the vessel remained open. He used a prothesis of rubber, decalcified bone, or artery wall to reënforce his anastomosis rings.

In 1892 Vignolo also successfully performed an end-to-end anastomosis of artery and vein.

Carrel, working with Berard, in 1902, experimented with the prothesis method. He first used Payr's rings, which of late have been popularized by Lespinasse and Fisher, and also tried a prothesis of caramel, but finally discarded them both as useless. Then he experimented with end-to-end and end-to-side suture, using a technique very similar to the one he uses at present. He made only one attempt at the time of his first report to do arteriovenous anastomosis, and this resulted in death of the dog two days after the operation from hæmorrhage. He was doing this work in order to make possible the transplantation of organs as a physiological experiment. In his next report, however, of the same year, he relates with Morel two successful end-to-end anastomoses of the jugular and carotid, performed twice, with Professor Soulier, on the advice of Professor Jaboulay, because the latter thought it might be useful in thrombosis of the carotid with threatening softening of the brain.

San Martin y Satrustegui, in the same year, and some time before Carrel, tried this same jugular-carotid anastomosis on three goats, but without success.

In 1903 Exner and Hoepfner both attempted arteriovenous anastomosis, but found all their attempts followed by thrombosis at the site of the anastomosis.

In 1903 Gallois and Pinatelle experimented on the cadaver with a red injecting fluid, to determine the efficiency of the valves in arteriovenous anastomosis. They found that when they injected fluid into the main vein of the extremity it returned by the other veins, but when they occluded the other veins, the fluid would no longer flow into the main vein. Therefore they said the flow was obstructed by the valves. Whether or not the peripheral veins were obstructed by

thrombi in their smaller branches does not seem to have been determined. From these experiments on the cadaver Gallois and Pinatelle therefore concluded that the valves could not be forced in the living also, a conclusion which does not seem justified from their experiments.

Carrel and Guthrie, in 1905, reported a series of thirteen arteriovenous anastomoses, with only a single failure; and in a subsequent article, the following year, they reported having under observation an animal in which the jugular-carotid anastomosis had remained open for seven months. Since the publication of these later articles of Carrel and Guthrie, a very considerable number of successful anastomoses in animals have been reported by Stich, Tuffier and Frouin, Watts, Cottard, and Leriche. Most of these experimental observations, however, extend over relatively short periods of time, and it would be difficult to prove in many of them that the reversed arterial blood actually reached the peripheral veins and capillaries.

Up to the present writing there have been no means proposed of breaking down the resistance of the venous valves to the backward flow of blood, except by the action of the arterial current itself. It is also still a matter of doubt how much of the reversed current reaches the periphery in these cases, and how much is short-circuited, and what the individual variations are in the different cases. It is not even known for certain whether the femoral or saphenous vein, or their branches, will carry backward to the capillaries sufficient blood to maintain, unaided by the other vessels, that is, the collateral arteries, the circulation in the periphery of the limb. All these questions still remain to be determined by further experimentation.

CLINICAL RESULTS OF ARTERIOVENOUS ANASTOMOSIS

The first operator to attempt arteriovenous anastomosis in man as a means of treating gangrene of the extremities was San Martin y Satrustegui, a Spanish surgeon, who reports two cases. The first operation was performed in 1902, in the same year as, but prior to, Carrel's successful reversion of the circulation in the carotid artery and jugular vein. In San Martin's first case a double end-to-end anastomosis of the femoral artery and vein in Scarpa's triangle was done in the hope of checking an extending gangrene that had involved the great and second toes in a man aged fifty-two years. The immediate result was satisfactory, but the return of pain and the extension of the gangrene called for a thigh amputation on the sixth day after the anastomosis had been made. Death from "exhaustion" followed the amputation. Obliterative endarteritis and occlusion of the veins by thrombi were found at autopsy.

In a second case, reported with the first by the same author, he was unable to do an end-to-end anastomosis because of the great thickness of the artery. A puncture was made in the artery and a corresponding one in the vein. The vessels were then united by suture. The pains ceased, but the extending gangrene called for amputation in the middle of the foot. The amputation wound healed quickly.

The third case operated upon was that of Jaboulay. This operation was performed in 1902, shortly after those of San Martin. In this case obliterative endarteritis had caused gangrene of one lower extremity, calling for amputation at the thigh. A few months later symptoms of ischemia appeared in the other leg. These symptoms increasing, together with ulceration of the foot, led Jaboulay to attempt arteriovenous anastomosis. This was accomplished by lateral union of the vessels. The immediate result appeared hopeful, although at no time was pulsation or distention of the veins noted. On the fourteenth day after the operation gangrene of the foot was manifest, and extended until a line of demarcation was found at the upper third of the leg. Amputation at the thigh was done twenty-eight days after the anastomosis.

Since the report of these three cases, all of which were operated upon in 1902, there have been reported thirty-four cases in literature at our command.

Through a personal communication, Dr. Carl Beck, of Chicago, has given us the details of two patients operated upon by him (one a double anastomosis). These with 2 cases operated upon in our clinic at St. Luke's

Hospital make in all 41 cases, with 42 arteriovenous anastomoses that have been performed for threatened or actual gangrene up to the present time.

Of the 42 operations on 41 patients reviewed in this paper, there were 40 in which the sex was noted. Of these, 28 were males and 12 females. The age was noted in 34 cases. This varied from twenty to ninety years. Classified in decimal periods, there were:

Between 20 and 30 years	3
Between 30 and 40 years	1
Between 40 and 50 years	6
Between 50 and 60 years	4
Between 60 and 70 years	13
Between 70 and 80 years	5
Between 80 and 90 years	2

In Carl Beck's first case a double operation was made for bilateral gangrene. Of the others, 11 were for "threatened" and 31 for actual gangrene.

Of these cases, the cause of the gangrene was given, or could be inferred from the pathological report, in 41. Of these, there were 33 described as arteriosclerosis; two were due to embolism; 1 to infection, and 3 to presenile endarteritis. Of the latter, the case of Lilienthal is of interest, inasmuch as gangrene occurred in a young man aged twenty. At operation the popliteal artery which was to be anastomosed was found sclerosed and obliterated. Later on another anastomosis was made high up in Scarpa's triangle. Of the two other cases of this type, von Schmieden reports one in a male, aged twenty-nine, the only etiological factor evident being the too free use of tobacco. Carl Beck reports a case of this form of gangrene in a young negro (age not stated), in whom the cause of bilateral gangrene was thought to have been exposure to cold nine years previous. Previous to the operation there was no tendency to the formation of a line of demarcation. After the operation this appeared promptly on the right side, while the gangrene spread rapidly on the left. Double thigh amputation was required eventually. On the left side there was arterial spurting noted at the amputation, while on the right side parenchymatous oozing alone was seen. Examination of the amputated legs revealed obliterating endarteritis. Both amputated stumps healed kindly.

In two of von Schmieden's cases, the femoral artery at the time of operation was found about the size of a goose-quill and pulseless. No attempt was made to complete the operation. Amputation was performed. The stumps healed slowly.

Embolism was the cause of actual gangrene in two cases—those of von Schmieden and Doberauer. That of von Schmieden occurred in the course of an endocarditis in a female, aged forty-eight years. The right foot first became cold, cyanotic, and pulseless. Gangrene developed, and an amputation of the leg was performed. Later, the same symptoms appeared in the other foot. Anastomosis of the femoral artery and vein by Carrel's method. Immediate pulsation in the vein below; although no pulsation could be felt in the foot, yet the color distinctly improved; anesthesia persisted. Two days after the anastomosis the color became darker, the anesthesia more marked. Death from cardiac insufficiency on the third day. Autopsy showed a clot below a patulous anastomotic opening. All valves of the veins seemed to have been forced. Von Schmieden's opinion is that the anastomosis was the immediate cause of death by throwing too much work on an already impaired heart.

Anastomosis of the axillary artery and vein was done by Doberauer for "threatened" gangrene due to embolism. In this case arteriotomy was twice done with the hope that by removing the obstruction the circulation might be restored. This procedure failing, anastomosis was resorted to, with success. Active pulsation of the vein below the point of anastomosis was evident for eight days. No further history is given.

Anastomosis was resorted to in three cases of traumatic gangrene of the lower extremity. Of the cases reported under this head we have one of Carl Beck, one of Imbert, and one of Torrence. In Beck's case the patient suffered from a compound comminuted fracture of both bones of the leg. Anastomosis of the proximal end of the anterior tibial artery to the cut distal end of the corresponding vein

was done by Carrel's method. Within a few hours the color improved in the leg below the anastomosis. No extension of the gangrene. Death in forty-eight hours from pneumonia. No examination of the leg made.

Imbert's case was that of a sailor who received a gunshot wound of the deep femoral and popliteal arteries, and also a perforation of the popliteal vein. End-to-end anastomosis of the popliteal artery and vein after ligation of the deep femoral. Gangrene supervened, necessitating amputation at lower third of thigh.

Torrance anastomosed the anterior tibial artery to the internal saphenous vein in a case of compound comminuted fracture of the right leg. The posterior tibial artery was intact. The circulation in the foot remained adequate, although the anastomosed artery and vein became impervious and sloughed on the twelfth day. Amputation was performed four months later for disease of the bone. In a case described as gangrene due to "suppuration," Orhan anastomosed the popliteal artery and vein when the gangrene had involved the small toe alone. Warmth returned for a short time to the foot, but the next day the gangrene spread. Amputation of the leg was necessary.

Of gangrene ascribed to arteriosclerosis there are 33 cases, most of which possess no particular interest from the pathological side. In four the gangrene developed in the course of a diabetes, probably the essential cause of the arterial disease. It is reasonable to suppose that in many more of the cases there existed glycosuria, but no mention is made of it. Of the four cases in which diabetes is mentioned as a factor in the etiology, we have our own two, one of Mauclaire, and one of Fritz Mueller.

Local changes indicating an immediate improvement were noted in 23 cases. The signs interpreted as favoring an increased arterial blood supply due to the reversal of the circulation are, in order of frequency:

1. Increased warmth of the affected part.
2. Improvement in color.
3. Relief from pain.
4. Improvement in sensation.
5. Filling of the superficial veins.
6. Pulsation in veins of the extremities below the site of anastomosis.
7. Return of the part threatened by gangrene, or actual seat of gangrene, to the normal.

In general, in many of the cases said to show improvement no mention is made of the specific evidences of return of the circulation. The restoration of normal color is many times the only sign noted.

Pulsation of the vein in the extremity, which is considered by some as conclusive evidence of a restored circulation, is mentioned in 14 cases. In some it is not clear whether it is meant that the main trunk pulsated below the anastomosis in the operation wound, or that superficial or deep veins some distance below were actively pulsating.

In the case of Ballance, a woman aged seventy-five years, operated on for senile gangrene, immediate pulsation in the femoral vein was noted. Later on in the same day the veins on the dorsum of the foot were seen to be filled with blood and to pulsate. The gangrene, which is described as reaching the dorsum of the foot, remained stationary; the discoloration of the two toes immediately disappeared. The tissues regained their normal appearance. The patient died four months after the anastomosis, during which time the gangrene did not extend.

This is the only case that we found where the circulation was so far improved by the anastomosis as to control an actually existing gangrene, and to bring about a restoration of the part, not actually gangrenous, yet presenting evidence of impending gangrene.

The value of active venous pulsation as an evidence of actual reversion of circulation in the extremity is questioned by Delbet. He maintains that it indicates only a modification of the blood pressure in the veins, and not a circulation of arterial blood through the vessel.

The experiments of Gallois and Pinatelle go to show that there exists a centrifugal blood wave in the veins. Delbet and Monod and Vanverts regard this as offering an explanation of the venous pulsation in arteriovenous aneurysm, rather than that the arterial blood actually passes through the vein.

In one of Wieting's cases, an anastomosis of the femoral vessels was made for "threatened" gangrene. Previously the opposite leg had been amputated for gangrene due to arteriosclerosis. After the anastomosis the lividity and pain disappeared. The toes and foot regained their normal color and were warm. Two months after the operation there were no pains or other signs of impending gangrene.

Regaining of warmth and return of normal color, if established, would be strong presumptive evidence of the possibility of establishing a reversion of the circulation. In the cases in which this was noted, excepting in the two mentioned (Wieting and Ballance), these favorable signs were of short duration. In our first case they were present after the operation and lasted for about one week.

REMOTE RESULTS

In the cases reported we find:

Deaths	21
Recoveries	20
Deaths after primary operations, without secondary amputation	11
Deaths after amputation	9
Deaths after opening abscess	1
	21

In 7 no definite statement is made as to the immediate results.

In 4 anastomosis was not accomplished.

In two of von Schmieden's cases the pathological condition found in the artery would not permit of anastomosis being made. The femoral artery was ligated in each, and the amputation of the thigh performed after the line of demarcation had formed. Both recovered.

In 2 of Mauclaire's cases the anastomosis leaked and the femoral artery was ligated in each. In both death occurred—in one from "cachexia," "in a few days," and in the other from "cardiac and pulmonary complications shortly after the operation."

Amputation of the leg or thigh followed the anastomosis in 18 cases. Of these, 9 recovered and 9 died.

Deaths directly traceable to the anastomosis operation occurred in 3 cases.

In Lilienthal's case, in thirty hours, from shock.

In one of von Schmieden's, cardiac failure due to increased work thrown upon the heart, on the second day. This was a case of embolic gangrene with endocarditis and mitral obstruction.

In Imbert's case, from exhaustion following operation, on second day.

Deaths from causes not traceable to the anastomosis occurred in 8 cases:

1. Beck's case, pneumonia, in forty-eight hours.
2. Goldenberg, erysipelas, on fifteenth day.
3. Ballance, gangrene of intestine, four months after.
4. Celesia, syncope, on twenty-seventh day.
5. Jaboulay, pulmonary embolism, on nineteenth day.
6. Jaboulay, cerebral embolism, on fifth day.
7. Halstead, diabetic coma, on fourth day.
8. Fritz Mueller, diabetic coma, on tenth day.

In the remaining cases (10) death was ascribed to the disease that called for the anastomosis, and followed secondary operations in most cases, and therefore could not be charged to the anastomosis.

It goes without saying that the probability exists that the patient's chance of recovery would have been better had amputation been the first operation and not the last resort.

Reports of autopsy findings and of the examination of the amputated leg are as follows:

The anastomotic opening is specifically mentioned in 8 cases; in 6 it was patulous; in 2 it was closed.

All of the vessels of the limb are reported closed by thrombi in 5 cases.

The femoral artery above and popliteal artery below are reported closed in 5 cases of double anastomosis.

The femoral vein alone was reported closed below the anastomosis in 5 cases.

The veins below the anastomosis were reported filled in 6 cases.

The anastomotic opening was imperfect in one case.

Short-circuiting of blood through a collateral vein was evident in one case.

Occlusion of central end of artery was found in 2 cases.

Red blood was seen to spurt from the anastomosed vein at time of the secondary operation in 2 cases.

TECHNIQUE IN FEMORAL ANASTOMOSES

	Cases
End-to-end	22
Femoral: Beck	2
v. Schmieden	1
Mauclaire	3
Hubbard	4
Geo. Mueller	1
Halstead	2
San Martin	1
Lilienthal	1
Tuffier	1
Lund	1
Jaboulay	2
Armour and Smith	1
	20

Lateral implantation (Wieting's method):

Femoral: Tietze	1
Goldenberg	1
Wieting	1
F. Mueller	2
Krueger	1
	6

Latero-lateral:

Femoral: San Martin	1
Jaboulay	2
Tuffier	1
Abalos	1
Imbert	1
	6

Other vessels than the femoral were united in four cases.

Anterior tibial: Torrance	1
Carl Beck	1
	2
Axillary: Doberauer	1
Popliteal: Imbert	1

No mention of method in 6; Celesia, 1; Mauclaire, 2; von Schmieden, 2; Ballance, 1; Orhan, 1.

CONCLUSIONS

1. There is experimental evidence to show that in animals the circulation through the large veins of the extremities may be reversed, and that it is possible for the normal blood pressure in the arteries to overcome the resistance of the valves of the veins.

2. Experimental and clinical evidence show that the anastomotic opening is not permanent, but that gradual obliteration by intimal overgrowth takes place in event of the failure of early occlusion by a thrombus.

3. There is not sufficient clinical evidence in the reported cases to show that the pressure of the blood in the arteries in the cases operated upon was sufficient to force the valves in the veins.

4. It is also shown by the cases reported that early occlusion of the vessels about the anastomotic opening by a thrombus was the rule, and in many the opening never at any time functionated.

5. In event of the arterial blood forcing the valves in close proximity to the anastomotic opening, it returns chiefly through the larger communicating veins in many if not most instances and does not traverse the capillaries.

6. A study of traumatic arteriovenous aneurysm shows that with a normal arterial pressure it required weeks or months for the valves in the communicating vein to be overcome, as is evidenced by the gradual development of varicosities and the long-delayed pulsation in the veins remote from the seat of aneurysm. Under these conditions, the arterial blood supply is maintained partly through the usual collateral channels which are unobstructed. In cases of gangene from obliterating diseases of the arteries, the collateral vessels are already occluded. In such a case immediate reversion of the circulation is imperative. This cannot be accomplished at present:

(*a*) Because of the obstruction offered by the valves.

(*b*) Because in many cases the circulating blood must also overcome the resistance offered by a thrombosed vein.

(*c*) Because the blood returns through the nearest communicating vein and does not reach the peripheral capillaries.

7. Our final conclusion is that there is but one indication for the application of arteriovenous anastomosis in surgery; *i. e.*, in traumatic destruction of a principal artery, where

end-to-end union of the torn vessel is impossible. In such a case arteriovenous anastomosis might be attempted, and through it we might maintain a sufficient blood supply to preserve the integrity of the limb until an adequate collateral circulation was established.

CASES OPERATED ON BY DR. HALSTEAD

CASE 1. Engineer, aged sixty-two years; entered St. Luke's Hospital May 22, 1910. Fifteen years ago he was refused life insurance because of sugar in his urine. Has been on a diabetic treatment under doctor's care most of the time since then. Sugar is still present on admission. No diacetic acid or acetone.

Two years ago a corn developed on his left foot; an ulcer gradually formed at this site, and from here a slow infection went on, which necessitated amputation of his foot. A similar ulcer now developed on his right foot, and for this he entered the hospital.

May 24. Ulcer of the foot painful. Surrounding tissue red, edematous, and tender. Daily dressings with limb elevated in the interval and heat applied. No improvement.

July 8. Amputation of the right fifth toe and metatarsal under spinal anæsthesia. Fifteen drops of two per cent. cocaine solution used. The tissue removed was nearly all necrotic. No sutures were applied. Balsam of Peru dressing. Daily irrigation with boric acid solution and dressing of Balsam of Peru. Some apparent improvement for a couple of weeks. Then the gangrene began slowly to spread, and the patient began to suffer from severe pains in the foot and leg.

August 11. Arteriovenous anastomosis done by invagination of the femoral artery into the femoral vein, in the hope of producing demarcation. Incision at apex of Scarpa's triangle. An attempt was made to form a cuff on the artery, for it was too rigid; therefore the artery was drawn into the vein by three fine Pagenstecher sutures, and the vein closed over the artery by additional fine catgut sutures. When the constriction was removed from the artery, no hæmorrhage occurred from the sutured vessels, but pulsation was visible in the end of the femoral vein exposed in the operation wound. The soft parts were united around the vessels with catgut and the skin with silkworm gut, and the usual silver foil dressing applied. Patient put to bed with foot elevated and wrapped in cotton. The operation wound healed promptly by primary intention.

August 12. No pain in the foot to-day, but some slight tenderness around the base of the fourth toe. Color much less dusky and foot warmer than before the operation. No particular dilatation of the superficial veins noted at any time, nor any pulsation in them.

August 15. Foot is apparently improving daily; warmth and color good. No pain. But toes are still rather cool and the fourth toe has not as good a color as the others.

August 16. Metatarsal region cooler and has not so good a color as yesterday.

August 17. Metatarsal region and toes darker and colder. Some disagreeable odor at the previous amputation site.

August 18. No improvement; pains at times severe.

August 20. Slight amount of acetone in the urine no diacetic acid.

August 22. Metatarsals appear doomed to dry gangrene. The duskiness is extending up the foot.

August 24. Cyanosis extending to side of foot and along sole. Patient seems a little irrational at times.

August 25. Sleeps a good deal; is sometimes hard to rouse.

August 26. Gritti-Stokes amputation of the thigh. The anastomosis is removed with the distal portion of the leg.

September 5. Stitches removed and dressing done. Amputation stump is healing well.

Death on September 14, five weeks after anastamosis, from diabetic coma.

The chief reason for attempting arteriovenous anastomosis in this case was that the patient had previously lost one leg from gangrene. The toes on the remaining foot were destroyed and everything pointed to a rapid spread of the gangrene to the leg. With a hope of limiting the gangrene to the part then affected, the operation was performed. There was strong evidence of an immediate improvement in the circulation of the foot. The pains, which were almost unbearable, ceased, and for five days the patient was free from discomfort. The color seemed to improve and the extremity was distinctly warmer than before the operation. Return of pain and spread of the gangrene made amputation of the thigh imperative. After the amputation no great improvement in the patient's condition was noted. Death resulted from diabetic coma on September 14, five weeks after the anastomosis was made, and two weeks after the amputation.

The leg was examined in the laboratory of Rush Medical College. The following are the findings upon dissection of the leg.

"The part submitted for pathological examination is that portion of a lower extremity of the right side situated below a point 6 cm. above the knee-joint. The specimen has been preserved in a ten per cent. solution of formalin. On examination it is found well-preserved and unchanged, except for the removal of the fifth toe at the metatarsophalangeal junction, and an ill-defined area about the site of removal, and including the fourth toe, which is black and hard and shrivelled.

"Dissection is begun near the upper end of the incision through an unhealed longitudinal incision, about 7.5 cm. long, over the middle of the popliteal space. From this point the vessels, both superficial and deep, are carefully dissected out, upward to

the limit of the specimen, downward to a point where they become inextricably fused with the black, hardened mass already described.

"Immediately beneath the incision there is found an artificial connection between the artery and vein at a point 6 cm. from the upper limit of the specimen. The vessels are sutured end to end with silk; there is a considerable thickening of fibrous tissue over the point of anastomosis. The free peripheral end of the artery and the free central end of the vein have been ligated. All of the femoral artery present above the point of anastomosis is full of a somewhat elastic substance composed of reddish-brown and lighter colored laminæ. Just distal to the anastomosis there is a saccular aneurysm in the popliteal vein, measuring about 1.5 cm. in diameter. This extends down to the next pair of valves, about 2 cm. below the line of suture, and is full of a substance similar in all respects to that found in the artery above. With the exertion of a slight force a probe of the size of a small goose-quill can be passed from the arterial side to the venous side of the anastomosis. From the artificial connection downward it is possible to dissect free the popliteal vein for a distance of 22 cm., the upper 8 cm. of which is occluded by a mass continuous with that in the aneurysm and identical with it. The lower 14 cm. is patent, but has flakes of calcium salts deposited in its walls.

"The portion of the popliteal artery lying between the site of the anastomosis and the artery's bifurcation is 17 cm. in length and is more or less occluded by disconnected hard masses, the largest of which do not quite fill the lumen. The anterior tibial artery is 40 cm. in length, and in its proximal 18 cm. has an average diameter of 3 mm. Beginning at a point about 1 cm. from its upper end there is found a transparent cord-like elevation on the vessel wall, which rapidly increased in thickness until at a point 8 cm. lower down the channel has been reduced to less than 1 mm. At varying intervals beyond this the caliber of the channel is seen to increase, decrease, disappear, and recur. The texture of this obturating cord-like structure is soft and elastic above, losing its resiliency as it proceeds downward until at the points of complete occlusion it attains a cartilaginous hardness, with a suggestion of brittleness on palpation. In the softer upper part well-defined blood-vessels filled with blood are found. That portion of the vessel wall which is not hidden from view is of a corrugated and sacculated appearance, and of gristly consistency on section.

"The posterior tibial artery is 34 cm. in length, and the entire vessel presents on longitudinal section an appearance similar to that described in the free portions of the anterior tibial artery. In the parts where this is most marked the vessel wall is exceedingly thin. There is no obturating formation in this vessel. The peroneal artery measures 29 cm. in length and contains friable masses which before compression filled the entire lumen. The long saphenous vein is apparently free from gross pathological change. The small saphenous vein is occluded by disconnected masses of various lengths and of the same friable consistency as those described above.

"Sections for microscopic examination are removed as follows: A piece of the posterior tibial artery is excised *in toto*, whereas segmental sections only are taken from the bulge of the aneurysmal sac and from the portion of the artery immediately above it.

"On examination, the section from the posterior tibial artery appears as a tubular structure of fibrillar texture without cellular differentiation, but showing a slight division into strata. With eosin and hematoxylin it takes a fairly even violet stain. Irregular nodules of granular material are seen on the inner wall and intramurally.

"Sections from the wall of the aneurysmal sac show a much thickened intima, with a peculiar radiate structure, which fuses directly with the thrombus that fills the lumen, and which is permeated by cells and well-staining nuclei, giving evidence of the beginning of well-defined organization.

"In the sections taken from the artery immediately above the sac there is a thrombus undergoing more active organization, without any noticeable changes in the vessel wall."

CASE 2. Mrs. K. A., aged sixty-four years; German; entered hospital September 23, 1910. States that right great toe has been discolored and ulcerated for a week. The foot was blanched and no pulsation could be felt in any vessel below the knee. Four and three-tenths per cent. sugar in urine on admission. Tests for acetone and diacetic acid positive. Denies previous illness or previous knowledge of diabetes.

September 25. Gangrene seems to be spreading upward. Amputation of the toe refused. Daily bismuth powder dressing.

September 27. End-to-end anastomosis by intubation of femoral artery and vein near the apex of Scarpa's triangle. No hæmorrhage occurred at the site of anastomosis when the constricting tapes were removed from the vessels. That part of the vein visible in the operation wound at once dilated and began to pulsate. The soft parts were closed around the anastomosis by catgut and the skin with silkworm gut and silver foil in the usual way.

The patient went rapidly into diabetic coma, and died three days after the operation.

In this case there existed a gangrenous ulcer that refused to heal. Amputation was refused. Anastomosis was performed with the hope that the pain would be relieved and the spread of the gangrene controlled. After the operation, which was difficult because of the small size of the vein and the extreme hardness and thickening of the arterial wall, pulsation as far as the lower end of the operation wound was observed in the vein. No

change in color or improvement in the general appearance of the foot were noted. This remained cold and livid. No extension of the gangrene. Death occurred in diabetic coma on the fourth day succeeding the operation. No autopsy.

CASES OF DR. CARL BECK.

CASE 1. Chicago, December, 1910. Young colored man. Gangrene of both feet several inches above the ankle, cause unknown. Patient said feet had been numb ever since freezing them nine years previously. The gangrene did not show a tendency to become demarcated, and therefore an end-to-end anastomosis of the femoral artery and vein was done by Carrel's method. Shortly afterward (exact time not given) the line of demarcation formed on the right side, and the dead tissues separated piece by piece up to the bone. The gangrene having progressed in the left leg, it was decided to do at the same time a double amputation of the thighs. At the time of the operation in the right leg there was no spurting of blood-vessels in the cut tissue, but parenchymatous oozing of bright red blood, apparently "showing this leg relatively well supplied with arterial blood through the veins." On the left side there was quite a little arterial spurting. The vessels in both legs showed endarteritis in the amputated parts, and both sides healed perfectly after the operation. No further examination of the arteries or subsequent history of the case mentioned. Nothing said as to dilatation of the veins, change in color of the parts, or pulsation of the veins.

CASE 2. Compound comminuted fracture of the leg below the knee, between the middle and lower third of tibia. No pulsation in the arteries of the foot. Skin blue and cold. The anterior tibial artery was cut down upon and the upper end found and allowed to spurt, and the distal end sought for, but not found. Therefore, an end-to-end anastomosis was made between the proximal portion of the artery and the distal portion of one of the large veins in the neighborhood. Shortly afterward the distal part of the crushed leg began to acquire a brighter color and more warmth, and remained so without any further signs of gangrene for forty-eight hours, at the end of which time the man died of a pneumonia. The anastomosis in this case was done by Carrel's method. Nothing said as to pulsation of the veins or subsequent examination of the anastomosis or vessels of the leg.

PREVIOUSLY REPORTED CASES

San Martin y Satrustegui ("Cirurgiadel aparato circulatorio," *Discours prononcé à la séance inaugurale de l'Académie royale de Madrid*, année 1902): Man, aged fifty-two years, farmer. Gangrene of a few months' standing in the great toe and part of the second, and about to attack the metatarsal. Double end-to-end anastomosis done. Immediate result satisfactory; then on the sixth day pains reappeared, with fever. Amputation of the leg at the site of election. Patient died of exhaustion after an amputation of the thigh (subsequent). Postmortem examination: The posterior tibial artery was obliterated by a marked proliferation of the intima. The adventitia was thickened and its vessels obliterated. The anterior tibial artery and the vein were apparently normal.

San Martin y Satrustegui (same reference as above): Man, aged seventy-six years; no syphilis nor alcoholism. Followed application of a too tight bandage. Gangrene continued to develop in spite of disarticulation of the toes. Latero-lateral anastomosis done. Artery was too thick to do an end-to-end anastomosis and was hard as a rock, so that two bistouries were spoiled on it. Finally, a puncture was made in the side, and the vein was sutured to this. A Symes amputation in addition; pains disappeared and wound healed. No report on the ultimate result.

Jaboulay ("Un cas d'anastomose artérioveineuse longitudinale pour artérite oblitérante," *Rev. de Chir.*, 1903, xxvii, 236; and in A. Lecercle, Anastomoses artérioveineuses, Contrib. á l'Etude de la chirurgie des vaisseaux, *Thèse de Lyon*, 1902–1903, n'79, Obs. III): A man, aged forty-seven years, alcoholic. Amputation of the right thigh (1902) for dry gangrene from arteritis. Arteriovenous anastomosis done two months later for similar gangrene in left leg. Latero-lateral operation was done in the triangle of Scarpa. No pulsation in the veins followed, nor other signs of success. The gangrene progressed, and an amputation of the thigh was performed at the end of a month. The large vessels were obliterated at the site of the amputation. Patient died on the fifth day, probably from a cerebral embolus. Examination of the amputated leg showed all the large venous trunks filled with relatively fresh clots. The popliteal artery was partly opened, but at the point of division was entirely obliterated.

J. C. Hubbard ("Arteriovenous Anastomosis," *Boston Medical and Surgical Journal*, 1906, clv, 647; Annals of Surgery, 1906, xliv, 559): Man, aged eighty years. Senile gangrene of part of the right foot. Invagination of the femoral artery into the femoral vein above the point of origin of the femoralis profunda, slight pulsation following the operation in the femoral vein just below the anastomosis. No change in the limb after operation. Gangrene extended to all the foot and then became demarcated. A month later amputation of the leg at the site of election. The anterior and posterior tibial arteries poured out red arterial blood. Patient well one year later.

Doberauer ("Demonstration eines Falles von operierter Embolie der Arteria axillaris," Wissensch. Gesell. deut. Aertze in Bœhmen, July 3, 1907; *Prager Med. Wochens.*, 1907, xxxii, 437): Woman. Embolism of the humeral artery. Threatened gangrene. Artery twice opened and a clot removed. Thrombus formed the third time and gangrene

progressed. Two days after the last arteriotomy the axillary artery and vein were anastomosed. Active pulsation in the vein below the site of anastomosis, which continued for eight days. Nothing said as to further outcome of treatment.

J. C. Hubbard ("Arteriovenous Anastomosis," *Boston Medical and Surgical Journal*, 1907, clvii, 185): Woman, aged sixty-six years. Senile gangrene of the foot and part of the leg, due to atheroma. End-to-end anastomosis of artery and vein (femoral) in Scarpa's triangle, below the origin of the femoralis profunda. Artery was calcified and friable, so that the threads tore through the wall, but after completion of the operation the vein showed pulsation. No improvement in the limb after the operation. Ten days later amputation was done above the knee. Examination of the amputated limb showed the artery filled by a fresh clot.

Lilienthal ("End-to-end Arteriovenous Angeiorrhaphy," *Annals of Surgery*, 1907, xlv, 2): Man, aged twenty years. Gangrene of the feet from arteritis. An attempt to anastomose popliteal artery and vein was given up because the artery was found completely obliterated. Four days later end-to-end anastomosis of the artery and vein was done above the entrance of the saphenous vein. The anastomosis was done at this level because only the upper part of the femoral artery showed pulsation. The operation lasted fifty minutes and was followed by considerable shock. The patient died thirty-one hours later without there being any signs of improvement in the affected limb. Examination of the anastomosis showed that the union was good, but there was a fresh clot in the vein. Lilienthal thinks that any operation on this weakened patient would probably have produced death.

Torrance ("Arteriovenous Anastomosis, with Report of a Case," *Annals of Surgery*, 1907, xlvi, 333): Man, aged forty years. Complicated fracture of the right leg. Posterior tibial artery ruptured. Much shock. The anterior tibial artery was implanted into the saphenous vein. Suture of the soft parts. Pulsation continued in the artery for one day and then stopped. A clot probably formed. The foot healed. Four months later the leg was amputated at the patient's desire, for "disease of the bone." Examination of the amputated part is said to have given no evidence as to how the circulation reëstablished itself.

Tuffier (*Bull. et Mém. de la Soc. de Chir.*, 1907, xxxiii, 417): Man, aged fifty-six years; alcoholic and syphilitic. Typhoid fever at twenty years. Gangrene of three months' standing in the foot. Femoral vessels united side-to-side at the apex of the triangle of Scarpa. Vein promptly dilated and pulsated. Eight days later the foot was no better. The patient died eleven days later. Autopsy: Gangrene extended to the knee; femoral artery open; vein obstructed below the anastomosis by an adherent clot.

Tuffier (cited by E. Cottard, "Anastomoses et greffes vasculaires," *These de Paris*, 1907–1908, No. 373, Obs. viii, page 63): Man, aged fifty years. No syphilis; moderate alcoholism. No sugar or albumin in the urine. Violent pains in the foot and beginning gangrene. End-to-end anastomosis done in the middle of the thigh. Distal end of the artery and proximal end of the vein tied. The following day there was pulsation in the vein below the anastomosis and along the course of the internal saphenous vein. These were less marked on the following day and then disappeared. Probably slight infection at the site of anastomosis. The pains disappeared, but the gangrene remained the same. Patient left hospital in a few days. No further report.

Ballance (Arteriovenous Anastomosis for Senile Gangrene," *Lancet*, 1908, i, 1412): Woman, aged seventy-five years. Senile gangrene of the toes of the right foot, beginning to extend to the dorsum of the foot; severe pains. Arteriovenous anastomosis at the level of Hunter's canal. Pulsation in the internal saphenous vein and in the veins on the dorsum of the foot appeared on the evening of the operation. The foot became warm and the pains ceased. The discoloration of two of the toes disappeared. The gangrene made no progress in the following months, and demarcation in the already affected toes occurred. Death five months after the operation from gangrene of the intestine.

J. C. Hubbard ("Arteriovenous Anastomosis for Gangrene," *Annals of Surgery*, 1908, xlviii, 897): Woman, aged eighty-four years. Right foot amputated for senile gangrene. A few months later the left foot showed similar change. End-to-end anastomosis below the femoralis profunda. Artery shows no atheroma, but is somewhat thickened. After the operation the leg became warmer; the spread of the gangrene stopped, but a month later it began to spread again, and two months after the operation the patient died. At the autopsy there was atheroma of the femoral artery and its lumen was much narrowed. There was a thrombus obliterating the femoral vein and its branches. The anastomosis was completely obliterated.

F. B. Lund ("A Case of Arteriovenous Anastomosis for Obliterative Endarteritis," *Boston Medical and Surgical Journal*, 1908, lix, 683): Man, aged thirty-two years. Threatened gangrene of the left foot. End-to-end anastomosis of the femoral artery and vein. The superficial veins of the foot became dilated and pulsated. Gangrene of the big toe took place. Patient refused amputation of the leg, and so the big toe and its metatarsal were amputated, but the flaps underwent gangrene, and therefore a little later the leg was amputated.

Wieting ("Die angiosklerotische Gangræn und ihre operative Behandlung durch arteriovenöse Intubation," *Deuts. med. Wochens.*, 1908, xxxix, 1217): Man, aged forty years. Amputation below and then above the right knee for gangrene A few months later severe pains set in in the left leg, with coldness and lividity. Arteriovenous anastomosis by lateral implantation of the artery into the vein was performed at the apex of Scarpa's triangle.

The toes and foot became warm and pink, and the pains disappeared. Two months after the operation there were no further pains nor any signs of gangrene. The operation wound healed perfectly. A complete success.

Orhan (quoted by Wieting, reference as above, p. 1200): Suppurating gangrene of the small toe. Anastomosis of the popliteal artery and vein. Warmth returned at once to the foot, but on the next day the foot was as bad as ever and the gangrene began to spread. Amputation of the leg performed Extensive suppuration along the fascial planes. No bleeding from either arteries or veins

Jaboulay (cited by P. Charnois, "Du Traitement Chirurgical des Gangrenes d'Origine Artérielle," *Thèse de Lyon*, 1908–09, No. 85, obs. v, p. 21, and also by Monod and Vanverts "L'anastomose arterioveineuse," *Arch. gén. de Chir.*, 1910, vi, 455): Man, aged forty-three years. Intermittent claudication in the left foot. Toes cool and blue. Then dry gangrene of the toes, which began to spread. Arteriovenous anastomosis in September, 1908, with Carrel as an assistant. End-to-end anastomosis between the femoral artery and vein at the middle of the thigh. Ligature of the peripheral end of the artery and of the central end of the vein. After the anastomosis was completed the blood penetrated the vein and distended it to double its previous diameter. Operation wound healed. The gangrene seemed to demarcate somewhat, but otherwise there was no improvement. On account of the severe pains and the secondary infection of the gangrenous parts, amputation was done in the inferior third of the leg. The large arteries did not bleed, but some of the smaller muscular vessels did. The internal saphenous was thrombosed. The stump healed well and the pains disappeared. Three weeks after the operation the patient died suddenly of a large lung embolus. Examination of the limb showed that the large part of the arterial blood had been short-circuited by a collateral of the femoral vein a short distance below the site of anastomosis, so that the main arterial current did not pass to the extremity of the limb. There was a thrombosis in the femoral vein, which extended to the iliac. It was part of this clot which detached and caused death. There was also a large recent clot at the site of anastomosis. It was by the collateral mentioned above that the thrombosis spread from the site of the anastomosis to the central end of the femoral vein, thus causing death.

Abalos ("Sobre un caso de anastomosis arteriovenosa por gangrena del pie de origen ateromatoso. Arteria femoral y vena safena," *Argentina Med.*, 1909, vii, III; et Comm. ecrite, quoted by Monod and Vanverts, reference as above, p. 457): Man, aged sixty-two years. Short time previously amputation of the thigh for gangrene of the left foot; beginning gangrene of the right foot. Latero-lateral anastomosis of the femoral artery and saphenous vein at the apex of Scarpa's triangle. Immediate pulsation of the saphenous vein. Improvement for ten days; then gangrene began to spread again. On the twentieth day after the anastomosis amputation at the upper third of the thigh. Previous to this the saphenous pulsation had disappeared, as well as pulsation of the femoral artery. Two months later the patient was still living and well. Examination of the amputated leg: Femoral artery and saphenous vein were occluded by extensive thrombi.

J. C. Hubbard ("Report of a Case of Arteriovenous Anastomosis for Senile Gangrene," *Boston Medical and Surgical Journal*, 1909, clxi, 513): Man, aged seventy-seven years. Threatening gangrene of right foot, with severe pains. No dorsalis pedis pulse; no posterior tibial. No albuminuria or glycosuria. End-to-end anastomosis two inches below the origin of the profunda. Venous pulsation began immediately. Immediate improvement in the color of the foot. A week later patient was up and about. The pains were nearly gone. Three weeks later gangrene started again to spread. Five weeks after the operation amputation of the thigh at the lower third. At the operation red arterial blood issued from the vein. The diameter of the jet was such as to lead one to believe there was no diminution of the lumen.

Imbert (quoted by J. Fiolle, "Anastomose artérioveineuse dans un cas de gangrène sénile," *Marseille Méd.*, 1909, xlvi, 372): Man. Arteriosclerotic gangrene of the foot following toe amputation for gangrene. No sugar or albumin in urine. Latero-lateral anastomosis of femoral artery to saphenous vein. "Immediate result excellent, but death two days later of *cachexia*." The vein dilated immediately after the operation, but did not pulsate. Postmortem: Anastomosis open, though small. Artery very sclerotic.

L. Imbert and J. Fiolle ("Trois observations de sutures vasculaires," *Marseille Médical*, 1909, xlvi, 417, obs. i): Man, aged twenty-five years; sailor; syphilitic. Bullet wound of the thigh penetrating femoral artery, and also popliteal artery and vein. Ligation of femoral and end-to-end anastomosis of popliteal artery and vein. Pulsation in the internal saphenous the same evening, but gangrene occurred and the leg was amputated in the lower third of the thigh. Examination of the limb: Artery and vein are very incompletely united. Lumen of the artery is obliterated by adherent clots.

D. J. Armour and E. A. Smith ("A Case of Arteriovenous Anastomosis for Gangrene," *Lancet*, 1909, ii, 919): Man, aged sixty-nine years. Arteriosclerosis marked. Threatened gangrene of the foot and leg. Double end-to-end anastomosis of the femoral vessels. Saphenous vein ligated "to prevent short-circuit." No improvement after the operation. On the fourth day, line of demarcation appeared at upper third of the leg. No popliteal pulse. Two weeks after the operation amputation above the knee. It was found that the vein had remained permeable, while the artery was obstructed by a clot. At the level of the flap the vein pulsated like an artery and was tied. The vessels

were cut 8 cm. below the site of anastomosis. Recovery. Examination of the amputated leg showed thrombosis of nearly all the veins.

A. F. Celesia ("Anastomosis arteriovenosa lateral (arteria y vena femoral) en un caso de gangrena del pie," *Rev. de la Soc. Méd.*, Argentina, 1909, xvii, 574): Woman, aged fifty-two years. Toes of right foot amputated for gangrene, which later began to spread to the foot. Dorsalis pedis and popliteal pulse absent. Generalized arteriosclerosis. Enlarged spleen. Suture of femoral artery to femoral vein, with ligation of the internal saphenous, which was made difficult by great rigidity of the artery. The vein pulsated at once. On the seventh day slight infection at the operation site, which promptly healed, however. Three weeks after the operation, affected leg seemed in as good condition as the well one, but on the next day an abscess in the thigh was opened, and during the operation the patient died of syncope. Autopsy: No cause for death found. The femoral vein is open below the anastomosis and slightly dilated above the anastomosis. It contained a few non-adherent clots. The artery was open above the anastomosis and below it it was filled with a very adherent clot, which extended into the popliteal.

Tietze ("Zwei Falle von Wietingscher Operation, Intubation der Arteria femoralis in die Vena femoralis bei beginnender Gangrän," Med. Sekt. d. Schlesischen Ges. für Vaterländ, Kultur, December 17, 1909; *Allgemeine Medizinische Central-Zeitung*, 1910, lxxix, 57): Woman, aged sixty-nine years. Arteriosclerotic gangrene of the foot and lower part of the leg. No diabetes. Terminolateral anastomosis of femoral artery and vein, but the blood did not seem to flow into the vein. Gangrene continued to spread after the operation. Death from cachexia on the nineteenth day. Autopsy: The central end of the artery was occluded by a clot.

Case 2. This case was operated by Tietze's assistant, Dr. Goldenberg. Patient, man, aged sixty-four years, with arterio-sclerotic gangrene of the right foot. The clinical symptoms were similar to those in the first case. The operation was done by Wieting's technique, and was successful in so far as pulsation appeared in the right popliteal artery which was absent previously. The patient also said that he experienced "a feeling of life" in the affected leg. The leg also became warmed and the sensibility improved. The gangrene stopped and demarcation occurred. On the fifteenth day after the operation erysipelas set in in the affected leg and caused the death of the patient.

Postmortem: The point of the anastomosis was surrounded by a very considerable layer of connective tissue. The lumen was open, but partly plugged with clot. The artery was so markedly changed that there was only a slight chance of success in any case. Tietze thinks that the most important thing in the operation is the selection of the proper cases for it.

Jaboulay ("*Obs. communiquée par Rivière*," quoted by Monod and Vanverts, reference as above, p. 463): Man, aged sixty-seven years. Beginning arteriosclerotic gangrene of the foot following slight injury with a nail scissors. Marked cardiac arrhythmia. Chronic bronchitis, with congestion of the bases of the lungs. No sugar or albumin in the urine. End-to-end anastomosis of femoral artery and vein at the middle of the thigh. Slight local improvement in foot following the operation, but gangrene began to spread again five days after the operation. Seven days after the operation the whole leg was cyanotic and covered with bullæ. Fever of 40° C. Amputation of the thigh seven days after the previous operation. A large clot filled the femoral vein. Death four days later from pulmonary congestion and cardiac insufficiency.

Krueger ("Klinische Beiträge zur Gefasschirurgie," *Arch. f. klin. Chir.*, 1910, xci, 577): Woman, aged forty-eight years. Complains of paresthesia in the right foot for one year; color became black recently. No syphilis or diabetes. Demarcation has already occurred. Pulse absent in the dorsalis pedis and popliteal arteries. Operation, August 27, 1909. Spinal anæsthesia, with novocain. No constrictor used. The exact Wieting technique was used and the anastomosis done below the profunda. Peripheral arterial and central venous stumps tied. Large collateral veins in the vicinity were also ligated. About eight linen sutures were used. Before the operation Moskowicz's experiment gave a reactive hyperemia to a point just below the knee. After the operation there was no special change in the foot. The vein was intensely dilated below the anastomosis, but there was no pulsation. Krueger thought that clotting had occurred, and therefore opened the vein by longitudinal incision; but only fluid blood escaped and this of a mixed arterial and venous character. There was slight oozing from one suture opening. Usual closure of the wound, in two stages. A few hours later the foot is markedly cyanotic; after raising it for a time, marked anemia again appeared, for which again the foot was laid down.

August 28. Patient complains of severe pain. Tips of the second to fourth toes bluish; foot cold; leg warm to the ankle.

August 29. The severe pains made morphine necessary. Blotched appearance to dorsum of foot. The gangrene of the big toe is progressing.

September 6. Pains have continued severe to date. The gangrene had reached the middle of the metatarsus; dorsum of foot copper-colored. The veins of the leg are dilated up to the knee, but do not pulsate, and are accompanied with red streaks. Operation wound has healed normally, but shows some infiltrate in the depth. No pulse below the femoral.

Operation: Pirogoff amputation of the foot. The dorsalis pedis artery is completely thrombosed; the posterior tibial is open, but does not bleed. Neither the veins nor the sawed bone bleeds much. Wound closed without suture; sterile bandage.

Dissection of the dorsal artery shows it completely closed to the periphery.

September 14. Marked redness and swelling of the leg up to the knee. Wound borders are gangrenous.

Operation: Amputation of the leg by Gritti's method. Preparation of the popliteal artery and vein shows them both closed by old thrombi, as likewise are all the arteries and veins of the leg, with the exception of a few superficial veins and a few deep veins. No further history.

F. Mueller ("Die Resultate der bisher ausgeführten arteriovenösen anastomosierungen bei angiosklerotischer Gangran mit besonderer Berucksichtigung der Wietingschen Operation," *Inaugural-Dissert.*, Berlin, 1910, published by E. Ebering): Man, aged sixty-three years, diabetes for eight years; four times has had slight beginning gangrene of the toes, which healed spontaneously. In January, 1910, a small ulcer appeared on the fourth toe of the left foot. Gradually the whole toe became black. On entrance demarcation already occurred, but there was some redness around the gangrenous area, especially on the plantar side, and not a little tenderness, which extended about to the middle of the sole. Inguinal glands not tender. Urine contains 3 per cent. sugar. For some days he was treated according to Bier's technique, with hot air baths and warm applications, but without any improvement. The left second and third toes and also the great toe have become somewhat bluish. Pains remained severe in foot. No pulse in the dorsalis pedis or posterior tibial, but strong in the femoral. Since the gangrene seems to be spreading somewhat and since the line of demarcation has not definitely formed, operation was undertaken by Wieting's technique, on May 10, 1910. Lumbar anæsthesia; femoral artery invaginated laterally into the femoral vein. Wound closed in layers. The same evening the whole leg is warm; the pains are much less; there is a feeling of numbness in the foot; there is no difference in color or temperature between the two legs.

May 11. Left leg warm; the gangrene seems to be becoming demarcated. The inflammatory reaction around it has diminished. No pains, but a feeling of weight in the leg. No pulsation or dilatation of the veins mentioned. Arterial pulse still absent in posterior tibial, and dorsalis pedis.

May 13. Demarcation still better; no pains. Five grams of sodium bicarbonate daily. On the 16th, some necrosis of the borders of the operation wound. The wound seems to have opened up somewhat in the depths on the 18th. Eructations marked. Patient very restless. Appearance of the leg good.

May 19. Vomiting. Patient is somewhat stuporous and looks bad. On the 20th, death in coma.

Autopsy. Operation wound gaping and necrotic, but the vessels are not exposed. The anastomosis site is easily recognized and is well united. An attempt was made to inject fluid unguentum cinereum with a syringe into the artery. The artery dilated under strong pressure up to the anastomosis site; then the vessels were taken out *in toto*. The lumen of the profunda is as large as that of the femoral. When the vessels were opened they were found filled with postmortem clots. At the anastomosis site the lumen was distinctly narrowed. Here the thrombus was somewhat adherent to the wall. The venous valves were stuffed full of hard thrombi, which may well have completely closed the lumen. The posterior tibial vein is freely opened. There are no thrombi on the valves here.

CASE 2. Man, age not given. Smokes 120 cigarettes daily. Syphilis denied. In 1908 pains appeared in the left foot, which became easily tired. Since that time patient has often noticed that left foot was cooler than the right. Various medicinal and bath treatments tried, without avail; also electricity. When patient came into hospital, the pains were so severe as to require control by morphine. Status: Well nourished. Left great toe inflamed and very painful. Nails of the large and small toes are absent. Necrotic ulcer on the ball of the great toe. Slight hypesthesia of the right great toe and outer border of the foot. Some small ulcers between the toes. The left foot is cold and shiny, with some bluish-red discoloration. No albumin or sugar. The pulse in the right femoral is stronger than in the left, but below normal at that. Pulse absent in the posterior tibial and dorsalis pedis on both sides. The left leg is cooler than the right. Operation, April 7, 1910: Spinal anæsthesia. Wieting technique used. The femoral artery and vein exposed just below Poupart's. The artery pulsates. The vasa vasorum are markedly injected. Marked arteriosclerosis. Femoral vein not sclerotic. No hæmorrhage from the sutures. Slight pulsation in the vein. Closure in layers. Leg not elevated. Evening of the same day: No change in the leg, which is warm up to the knee, but cold and numb below it.

April 28. Leg warm up to three finger breadths above the malleoli, and seems warmer than the right. The foot is slightly reddened. There has been no pain since the operation. Foot and toes can be moved. Sensation is rather slight in foot. Two thermometers tied on with cotton and bandages to both legs show, after being an hour and a half in position, 35.8° C., right; and 35.2° C., left.

April 29. Feet warm and red. No pains.

April 30. A few pains in the small and large toes. Legs warm. Thermometer readings: 36.4° C., right; 35.6° C.; left.

May 2. More pains in the right foot; no pains in the left. The ulcers on the small and large toes are getting smaller. Patient tried to move about most every day. No pulsations visible anywhere in the legs.

May 5. More pains in the left foot, especially in the small and large toes, particularly at nights. Operation wound has healed per primam. Daily hot air treatment of the left foot and leg.

May 9. Condition of the leg good. Hot air treatment continued.

May 14. More pains at nights; two morphine injections necessary.

On the 15th the left great toe is somewhat redder; skin is shiny. On the 23d, ulcerations on large and small toes have become somewhat larger. The bluish color of the great toe has extended to the foot, and the pains are getting bad again.

June 10. Pirogoff amputation. Primary healing.

June 16. Cyanosis of the whole heel. Wound opened on one side.

June 26. Gangrene is spreading. Severe pains in foot and heel.

June 30. Amputation of the leg in the upper third. (No further history.)

Jaboulay (cited by Monod and Vanverts, reference as above, p. 463): Man, aged sixty-six years. Gangrene of the right foot. Some atheroma. No sugar or albumin. Slight congestion at the bases of the lungs. Anastomosis by Jaboulay's method in the middle of the thigh. Pains slightly diminished after the operation, but the gangrene began to extend again three days later. Five days after the operation amputation of the thigh above the site of anastomosis. The anastomosis was found permeable, but the vein was completely obliterated below. Part of one flap sloughed, thereby necessitating reamputation of the bone a month later. Otherwise the patient made an uneventful recovery.

CASE 1. Von Schmieden (*Berl. klin. Woch.*, 1910, No. 13, pp. 571 to 573). Galician Jew, aged twenty-nine years. Presenile gangrene from overuse of tobacco. Left leg amputated four years ago because of similar gangrene. For the last three months pain, coldness, paresthesia and numbness in the right foot. He can use the foot only with great difficulty. Sleep is greatly disturbed because of pain. Popliteal pulse can barely be felt. No albumin or sugar in the urine. All reflexes much increased. Some diminution in sensation in the lower leg and foot. The gangrene gradually increased in spite of medical treatment, and so Wieting's operation was tried to save the leg. Operation, November 30, 1908. The femoral artery was found pulseless, hard, and about as thick as a quill. There were many newly formed (?), small, bleeding vessels around it. No attempt at anastomosis was made, but wound was immediately closed.

Amputation was done as soon as the line of demarcation formed. The stump healed slowly. Patient left the hospital on March 2, 1909; no further history.

CASE 2. A man, aged sixty-one years. Hard smoker and drinker. Beginning dry gangrene of the right small and large toes. Varicose veins marked. Much eczema of the legs and some healed varicose ulcers. Operation, January 21, 1909. The femoral artery was found pulseless and intensely sclerosed. There were many small bleeding vessels around it (old inflammation ?). Therefore, no attempt at anastomosis was made. The operation wound healed primarily. No change in the condition of the foot.

February 17. The dead toes have undergone spontaneous amputation. The condition of the patient remains good while in bed, but becomes much worse when he moves about.

March 10. Went home. No further history.

CASE 3. Woman, aged forty-eight years. In 1910 amputation of the right foot was done for embolic gangrene, due to heart disease. No diabetes.

January 4, 1909. Beginning embolic gangrene of the left foot, which is cold and blue. No pulse can be felt in the whole leg. No sensation in the foot. Heart: Mitral systolic murmur and thrill. Operation, February 4, 1909. Femoral artery and vein sewed together by Carrel's method (end-to-end) just below the origin of the profunda, the vessels being first freed from their adventitia. After removing the clamps from the vessel, the anastomosis is free from any leaking, and there is a vigorous stream of blood pulsating into the vein. No pulsation in the veins of the foot is visible after the operation, but the color of the foot is distinctly lighter. The same afternoon the color of the foot is normal, but cool. Cutaneous anæsthesia is still present in the foot. Toward evening the color of the foot has become somewhat darker, but promptly improved with massage.

February 5. In the morning the leg is normal in color and warm, but the heart action weak. The patient died at eleven o'clock A. M., of heart insufficiency.

Autopsy. Severe mitral and aortic endocarditis was the cause of the gangrene. There was an old organized thrombus of the posterior tibial artery near the origin of the anterior tibial. The anastomosis was open and at only one small spot in the vein was the contained clot at all apparent, so that it could be irrigated away with water. All the valves seemed to have been forced at once. Schmieden thinks that the operation was very good for the leg, but threw too much of a load on the heart.

CASE 1. M. Mauclaire ("Quatre essais d'anast. art.-ven.," *Arch. Gén. de Chir.*, Paris, 1910, vi, 815 to 826). Woman, aged sixty-three years. Senile gangrene of the whole right foot of three months' standing. Complete mummification of the foot. No discoloration or edema of the leg above the line of demarcation. No pulsation in the popliteal artery. Pulsation present in the femoral artery in the upper part of Scarpa's triangle. M. tried Moskowicz's test, which consists in putting an elastic bandage around the whole extremity for five to ten minutes. When the bandage is removed, the limb becomes very red down to the area in which the circulation is inadequate, which in turn is very pale. The site of the arterial thrombus and its extent can then be estimated from the known anatomical distribution of the vessels.

In this case the whole leg remained pale. The experiment was repeated, with the same result;

therefore, the thrombus was high up in the femoral artery.

Operation. Done near the apex of Scarpa's triangle. A high grade atheroma of the femoral artery was found. End-to-end anastomosis (by intubation ?) was done, the vein being cut obliquely across. Eight sutures were used, linen No. 500. Blood at once entered the vein, as could be seen from its dilatation and pulsation in the 7 or 8 centimeteres exposed in the wound. No local change after the operation. Eight days later amputation of the leg in the upper third. At the operation very little blood ran out of the anterior and posterior tibial arteries. No arterial blood came from the vein Gangrene of the flap occurred, and eight days later amputation of the thigh was performed. The same condition was found in the femoral vessels as in the tibia. Patient died seven days later of "cachexia."

Autopsy. The artery was thrombosed down to the place of suture. The vein was opened. The anastomosis was without fault.

CASE 2. Male, aged seventy-two years. Pains in left foot for three months. Gangrene of the foot to the malleoli for three weeks. It is spreading to the middle of the leg. Pulsation present in the femoral artery. Moskowicz's test not used for fear of causing the thrombosis to extend. Arteriosclerosis marked. Slight albumin in the urine. Diabetes a short time previously. Same operation was done as in the preceding case. No pulsation in the femoral artery. The artery was opened and found filled with blood. M. tried to pull it out by inserting a grooved director as far as the internal iliac, but he was not completely successful. End-to-end anastomosis was performed, however, seven sutures being used. Death nine days later from "exhaustion." Autopsy showed that the anastomosis evidently had not functionated.

CASE 3. Woman, aged sixty years. Senile gangrene of the whole foot of several weeks' duration and gradually spreading to the leg. Edema of the whole leg up to the point where arterial pulsation could be felt. Good pulsation of the arteries on the other leg. Aortic regurgitation present. Slight albuminuria. Operation, in spinal anæsthesia, with stovain. The femoral artery pulsated well; in fact, almost too well to make the anastomosis easy to perform. There was a great flow of blood, and some escaped at the operation site. M. was afraid that the arterial sutures would not hold, and therefore he tried the femoral artery. The patient died a few days later of "progressive cachexia." No autopsy report.

CASE 4. Female, aged sixty-six years. Violent pains in toes and fingers for six months. Gangrene of the left great toe for two months. Gangrene of the right index finger. All the extremities are cyanotic. Pulsation present in both posterior tibials and dorsalis pedis arteries. The radials very arterio sclerotic. The blood pressure is 230 millimeters. Aortic regurgitation present. (Mixed senile gangrene and Raynaud's disease.) Operation: End-to-end anastomosis (by invagination ?). Femoral artery very sclerotic, but pulsated very well. Blood leaked at the anastomosis site when the temporary vessel ligatures were removed, so that M. thought it wisest, in view of the high blood pressure and water-hammer pulse, to ligate the femoral artery as in the previous case. The gangrene progressed rapidly in the following days, and amputation of the thigh was performed. Death followed shortly after, being due to "des accidents cardio-pulmonaires." No autopsy report.

George P. Muller's case ("The Treatment of Gangrene of the Foot by Arteriovenous Anastomosis," *Annals of Surgery*, February, 1910, li, No. 2, p. 246). Operation: End-to-end anastomosis by Carrel's method of femoral artery and vein at apex of Scarpa's triangle and below origin of profunda. A complete reversal was not attempted. The artery was moderately slcerosed. After the operation the vein pulsated actively below the anastomosis. The leg and foot became warm and red. No visible pulsation of the superficial veins. In forty-eight hours the foot was cold to the ankle and the leg warm. On the third day a line of demarcation occurred at the tibiotarsal joint. Amputation at the middle third of the leg was advised, but refused. There was considerable absorption of toxins. Six weeks after the operation amputation was done four inches below the knee while the patient was in delirium. The posterior tibial and peroneal veins at this time showed feeble but distinct spurts of blood. There were many unusual sharp oozers. Anterior tibial did not bleed. All the arteries and the external saphenous vein were thrombosed. The internal saphenous vein was opened.

There was much suppuration in the flap after operation. Death occurred a little over two weeks later from exhaustion, that being nine weeks after the anastomosis. Neither autopsy nor examination of the operation site was permitted.

[Since the above article was written H. Coenen, of Breslau, read an article in the *Deutsche Gesellschaft f. Chirurgie*, and in the discussion a number of new cases were brought out. Professor Wieting, in the *Deutsche Zeitschrift f. Chirurgie* for July, 1911, has published 4 new cases of his own, which he calls successes, though 3 of them sooner or later required amputation. He also reported 2 cases of his colleague Orhan, previously unreported, which were failures, owing to thrombosis. These cases, with those brought out in Coenen's paper and the discussion of it, make 16 cases of arteriovenous anastomosis in addition to those previously reported in our paper, thus making in all 58 operations

TABLE OF CASES.

Age.	Sex.	Operator.	Publication.	Pathology.	Result, immediate.	Remote results.	Autopsy findings.	Technique.
52	M.	San Martin	Royal Acad. of Sci., Madrid, 1902	Gangrene of great toe and and part of second	Satisfactory	Gangrene spread on sixth day. Amp. thigh. Death	Obliterating endarteritis	End-to-end. Femoral vessels
76	M.	San Martin	Same reference	Gangrene from tight bandage. Disart. of toe	Pain disappeared	Symes amp. Wound healed. Recovery		Latero-lateral. Impossible to make end-to-end.
47	M.	Jaboulay	Rev. de Chir., 1903, xxvii 236	Amputation of right thigh for gangrene. Gangrene of left leg	No pulsation nor other favorable signs. No change in limb	Gangrene progresses. Amp. thigh on fifth day. Death.	Large vessels all thrombosed. Artery obliterated	Latero-lateral, in Scarpa's triangle.
80	M.	Hubbard	Annals of Surg., Oct., 1906	Senile gangrene of part of right foot	Slight pulsation in femoral vein just below anastomosis	Gangrene extended. Amputation one month afterward. Recovery	At time of operation both tibials contained red blood	Invagination of femoral artery into femoral vein.
?	F.	Doberauer.	Soc. de Med. All. de Boheme, 1907	Threatened gangrene. Embolism of brach. art. Arteriotomy twice done	Active pulsation in vein below, continued for eight days	Not stated. Recovery	None made	Not mentioned.
36	F.	Hubbard	Bost. Med. and Surg. Jour., 1907, clvii, 185	Threatened gangrene of foot due to atheroma	Veins filled; color good; no pulsation	Gangrene extended; amputation five weeks after. Recovery	Red blood spurted from femoral vein at operation	Carrel's end-to-end.
20	M.	Lilienthal	Annals of Surg., 1907, v. xlv	Gangrene from obliterating arteritis. Obliteration of popliteal	No signs of improvement	Shock. Death in 30 hours. Death	Operation. Popliteal artery obliterated. Femoral small	End-to-end at entrance of saphenous vein.
40	M.	Torrance	Annals of Surg., 1907, v. xlvi	Traumatic; ant. tibial united to int. saph. vein	Pulsation in artery for one day; then ceased	Foot healed; artery sloughed; leg amputated four months later. Recovery	No examination of amputation	End-to-end by invagination.
56	M.	Tuffier	Bull. et Mem. de la Soc. de Chir., 1907	Syphilitic gangrene of three months' standing of foot	Vein dilated and pulsated; eight days, foot not improved	No amputation. Death on eleventh day. Death	Femoral artery open. Vein thrombosed	Side-to-side at apex of Scarpa's triangle.
50	M.	Tuffier	E. Cottard. Thèse de Paris, 1907-1908	Alcoholic; beginning gangrene of foot	Pulsation in vein along course of internal saphenous	Gangrene. Remained same. Pain. Improvement. Recovery	No report	End-to-end at middle of thigh.
75	F.	Ballance	London Lancet, 1908, i, 1412	Senile gangrene extending to dorsum of foot	Pulsation in saphenous and dorsalis pedis veins same day	No extension; threatened part returned to normal. Recovery.	No report	Technique not mentioned.
29	M.	v. Schmieden	Ber. klin. Woch., 1910, No. 13	Presenile gangrene; previous amp. of opposite foot	Anastomosis could not be made	Amputation when line of demarcation was found. Recovery	Artery found obliterated	No anastomosis.
61	M.	v. Schmieden	Ber. klin. Woch., 1910, No. 13	Dry gangrene of toes on right foot	Anastomosis could not be made	No change. Gangrene remained stationary. Recovery.	Artery obliterated; pulseless	No anastomosis.
48	F.	v. Schmieden	Ber. klin. Woch., 1910, No. 13	Embolic gangrene from endocarditis. Right foot amputated. Left involved	Vein pulsated. None in veins of foot. Color improved	No change in gangrene. Death day following. Death	Endocarditis; thrombosis in post. tib. Anastomosis open	Carrel's end-to-end.
63	F.	Mauclaire	Arch. Gen. de Chir., 1910, v. i, 815	Senile gangrene of right foot. Line of demarcation. Mummification	Blood entered vein. No change in leg	Amputation eight days later. No arterial blood in vein. Death	Artery thrombosed down to place of anastomosis. Vein open. Orifice open	End-to-end by invagination.
72	M.	Mauclaire	Arch. Gen. de Chir., 1910, v. i, 815	Gangrene extending to malleoli for three weeks, to middle of leg	No improvement	No amputation. Death nine days later from exhaustion. Death	Artery found filled with clot at operation	End-to-end.
60	F.	Mauclaire	Arch. Gen. de Chir., 1910, v. i, 815	Gangrene, whole foot (senile), spreading to leg. Aortic regurgatiiton	Anastomosis leaked. Artery ligated	Death from progressive cachexia in five days. Death	No report	End-to-end. Leakage. Ligation of femoral.

TABLE OF CASES—*Continued.*

Age	Sex	Operator.	Publication.	Pathology.	Result, immediate.	Remote results.	Autopsy findings.	Technique.
66	F.	Mauclaire	Arch. Gen. de Chir., 1910, v. 1. 815	Gangrene of left great toe and right index finger. Mixed senile and Raynaud's disease	Anastomosis leaked. Artery ligated	Death shortly afterward from cardiac accident. Death	No report	End-to-end. Leakage. Ligation of femoral.
	M.	Geo. P. Muller	Ann. Surg., Feb., 1910		Foot became warm. Remained warm for forty-eight hours	Amputation below knee; two weeks later death from exhaustion. Death	Post. tibial open. Ant. tib. closed by thrombus. Vein open	End-to-end.
84	F.	Hubbard	Ann. Surg., 1908, xlviii	Left foot. Right had been previously amputated	Leg warmer. Gangrene did not spread for one month	Gangrene progressed after one month. In two months exhaustion caused death	Atheroma. Narrowing of lumen of femoral; vein obliterated	End-to-end.
32	M.	Lund	Bost. M. and S. J., 1908. lix	Threatened gangrene from obliterating endarteritis	Superficial veins filled and pulsated. No other change	Gangrene of big toe; amputation. Later amp. of leg. Recovery		End-to-end.
40	M.	Wieting	Deut. Med. Woch., 1908, xxxix	Gangrene of right leg; amputation. Pains and lividity of left	Toes and foot became warm. Pains disappeared	No further signs of gangrene after two months. Recovery	No Report	Lateral implantation of artery into vein.
?	?	Orhan	Deut. Med. Woch., 1908, xxxix	Gangrene of small toe. Suppurating	Warmth returned for one day; gangrene spread	Gangrene to knee. Amputation	At amputation no bleeding from any vessel. Suppuration	Not mentioned.
43	M.	Jaboulay	Charrois. Thèse de Lyon, 1908–1909, No. 85	Intermittent claudication. Cyanosis and lividity. Dry gangrene	Pulsation and distention of vein. No improvement	Gangrene spread. Leg amputated. Lung embolus caused death	Short-circuiting of blood through collateral. Thrombosis of femoral vein at anastomatic opening	End-to-end Carrel, assisted.
62	M.	Abalos	Argentina Med., 1909	Amp. of left foot. Beginning gangrene of right	Immediate pulsation of saphenous. Improvement for ten days	Gangrene spread. Amputation twenty days after anastomosis. Recovery	Femoral artery and saphenous vein both occluded	Latero-lateral at Scarpa's triangle.
77	M.	Hubbard	Bost. M. and S. J., 1909, Oct. 7	Senile gangrene of foot	Improvement in color and warmth	Gangrene and pain; in five weeks amputation. Recovery	Red blood spurted from femoral vein	End-to-end by Carrel's method.
?	M.	Imbert	Marseille Med., 1909, xlvi	Gangrene of foot; arteriosclerosis	Vein dilated. Did not pulsate	Death on second day. cachexia. Death	Arteriosclerotic; anastomosis open	Latero-lateral, femoral artery and vein.
25	M.	Imbert	Marseille Med., 1909, xlvi	Traumatic bullet wound of femoral artery, vein and popliteal artery	Pulsation in saphenous vein; gangrene	Gangrene, amputation of thigh. Recovery	Artery and vein not completely united	End-to-end.
69	M	Armour and Smith	London Lancet, 1909, ii, 919	Threatened gangrene due to arteriosclerosis	No improvement	Gangrene of leg. Amp. at upper third. Later amp. thigh. Recovery	Thrombosis of all vessels	End-to-end, double saphenous ligated.
52	F.	Celesia	Rev. de la Soc. Med. Argentina, 1909, xvii	Gangrene of foot; toes previously amputated	Improvement; pulsation of vein	Death from syncope while opening abscess. Death	Femoral vein open below anastomosis	End-to-end; ligation of saphenous vein.
69	F.	Tietze	Allg. Med. Central-Zeitung, 1910, lxxix	Gangrene of leg and foot; arteriosclerosis	No result	Gangrene spread. Death on nineteenth day. Cachexia. Death	Central end of femoral artery occluded	Termino-lateral of femoral artery and vein.
64	M.	Goldenberg	Cited by Tietze	Gangrene of right foot; arteriosclerosis	Marked improvement. Popliteal pulse reappeared	Demarcation. Death on fifteenth day. Erysipelas. Death	Vein clotted. Orifice open	Termino-lateral; femoral artery and vein.
67	M.	Jaboulay	Cited by Monod and Vanverts, Arch. Gen. de Chir., 1910	Gangrene of toe after injury and infection	Slight local improvement	Gangrene spread. Amputation seven days, of thigh four days. Death	Large clot filled femoral vein	End-to-end. Femoral artery and vein

48	F.	Krueger	Arch. f. klin. Chir., 1910	Gangrene following discoloration and paresthesia	No improvement	Gangrene spread. Pains continued. Pirogoff amputation on ninth day. Thigh amp. on seventeenth day. Recovery	All vessels closed by thrombi	Termino-lateral, Wieting method.
63	M.	F. Mueller	Inaug. Diss., Berlin. 1910	Gangrene of great toe, left foot. Diabetes	Leg warm. Pain less. Color restored	Gangrene became limited. No improvement. Diabetic coma. Death	Wound necrotic. Opening closed. Veins competent	Termino-lateral, Wieting method.
?	M.	F. Mueller	Inaug. Diss., Berlin. 1910	Gangrene of toe, threatened	No change except relief from pain	Gangrene of foot. Pirogoff amputation two months afterward. Later amputation of leg. Recovery	No report	Termino-lateral, Wieting method.
66	M.	Jaboulay	Cited by Monod and Vanverts, Arch. Gen. de Chir., 1910	Gangrene from atheroma of right foot	Pain improved	Gangrene extended. Amputation five days later. Recovery	Anastomosis open; vein obliterated before	Jaboulay's method.
	M.	Beck	Personal communication	Frozen feet, with spreading gangrene	Demarcation occurred	Recovery		End-to-end by Carrel's method.
	M.	Beck	Personal communication	Compound comminuted fracture of leg above knee	Pulsation reappeared. Warmer. Color better	Death from pneumonia after forty-eight hours	No report	End-to-end by Carrel's method.
	M.	Halstead	Original communication	Arteriosclerotic gangrene. Diabetes	Improvement. Pain less. Color better	Death	Aneurysm formation above first valve. Thrombosis	Termino-terminal by invagination.
	F.	Halstead	Original communication	Arteriosclerotic gangrene. Diabetes	Acetonuria. Coma	Death	No autopsy	Termino-terminal by invagination.

on 56 patients; one of Wieting's operations was done on Orhan's first case. Coenen's paper, which has already appeared in Bruns' *Beiträge*, vol. lxxv, pp. 313 to 367, is the most important of the recent contributions. His experimental work is particularly important, as showing the great difficulty in the way of the retrograde flow of blood in the veins. He showed that when dogs' vessels, the ligature of which is usually fatal, are anastomosed the operation results in an equal number of fatalities with the ligature, and that when Huerthle's stromuhr is inserted in the arteriovenous anastomosis it fails to record any flow of the arterial blood into the veins. In the discussion which followed Coenen's paper most of the surgeons took his side in decrying the practicability of this operation for gangrene. Bier and Schmieden, of Berlin, were the only ones to express opinions favorable, though guardedly so. Save for the 4 cases which Wieting, however rightly or wrongly, calls successes, all the others of the 16 were failures when done for gangrene. Of these, 2 cases are reported by Enderlen, 1 by Quenu, 1 by Heymann, which was of traumatic origin, 1 by Payr, 1 by Riedel, 1 by Coenen, and 2 by Unger, in both of which the operator had to desist on account of the obliteration of the entire femoral artery by endarteritis. The last case, that of Goyanes, was not done for gangrene and does not really belong in this series, although it was an arteriovenous anastomosis, because it consisted in the insertion of a piece of the popliteal vein into the popliteal artery after the excision of a popliteal aneurysm. The authors since the writing of this paper have had one case of arteriosclerotic gangrene, for which, however, they performed amputation as preferable to anastomosis.]

A STUDY OF AND DEDUCTIONS FROM FIFTY FATAL CASES OF PUERPERAL FEVER[1]

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THE occurrence of fifty fatal cases of puerperal sepsis in one hospital within twenty-nine months is my excuse for giving a résumé of the modern treatment of this common and protean condition. The Cook County Hospital, without question, receives many women who have been improperly cared for by physicians and midwives or who have had pregnancy interrupted by septic catheters or other means. These women are treated indifferently or neglected until their condition is serious or hopeless when they are sent into the hospital to die. Twenty-nine women in this series were hopelessly sick and fourteen seriously infected upon their admission.

In forty cases it was possible to get a statement as to the duration of the infection before entrance into the hospital.

From 2 to 5 days	14 cases
From 5 to 10 days	10 cases
From 10 to 20 days	10 cases
From 20 to 30 days	2 cases
From 30 to 40 days	3 cases
45 days	1 case
No history obtainable	10 cases
	50 cases

More than one-half of the women had been sick less than ten days and they were hopeless from septicæmia and general peritonitis. Of the remainder, all except seven were admitted when any chance to save them seemed lost. One case of embolism occurring in the hospital and two cases of postpartum hæmorrhage before admission turned the scale against the patient.

It is interesting to note the qualifications of the medical attendance and the nature of the treatment up to the time of admission. It is commonly supposed that the majority of fatal cases of sepsis can be traced to midwives because of their willingness to induce abortion and of their dangerous technique.

PHYSICIAN IN CHARGE OF CASE 21

Induced abortion	5
Spontaneous labor	5
Removed placenta manually	2
Curetted uterus	5
Irrigated uterus	1
Forcep delivery	3
Version and extraction	1
Packed uterus	1

MIDWIFE IN CHARGE OF CASE 20

Induced abortion	8
Labor at term	10
Removed placenta manually	1

The patient induced abortion upon herself in six instances.

Induced abortion is generally believed to be more dangerous from sepsis than labor at term. Because of the retention of decidua and consequent hæmorrhage, the attendant is more inclined to resort to intrauterine therapy. This fact is borne out in this series; twenty-two women being at term and twenty-six being abortions. The fact that in the twenty-two full term deliveries, fourteen (73.6 per cent) were spontaneous shows the danger of internal examinations and inefficient care following delivery. It is difficult to realize how these fourteen women could become so seriously infected had the internals been omitted or reduced to a minimum and conducted with antiseptic precautions. The tendency to examine the lying-in woman in normal labor should be greatly restricted if not entirely overcome in the majority of cases.

During their stay in the hospital, all patients were placed upon an energetic stimulating treatment consisting of strychnine, digalen, alcohol, and judicious feeding. Access to sun baths was possible in only a limited degree. Salines per rectum and by hypodermoclysis, adrenalin, antistreptococcic serum, and collargol were used in several cases. In twenty-two cases, the woman died within

[1] Read before the Chicago Gynecological Society, May, 1911.

forty-eight hours after admission; eight within eight hours. Nine women presented clear signs of general and three of local peritonitis at the time of operation. In twelve cases, operation was followed by an immediate change for the worse and undoubtedly hastened the patient's death. In two cases, the patient collapsed from the anæsthetic, while in two others the operation was unduly prolonged, lasting 65 and 125 minutes respectively. Both these latter cases were complicated by peritonitis.

Attention is called to three general fundamentals which have a decided influence in governing our treatment of puerperal sepsis.

1. All local forms of infection are self-limited. They tend to spontaneous recovery and *require no intrauterine therapy except in the presence of hæmorrhage*. The great majority of septic cases are of this character and under proper treatment all should recover. The treatment is decidedly *watchful expectancy*.

2. By the employment of many common methods of treatment, a local or simple type of sepsis may be converted into a virulent and fatal condition. The curette, the septic fingers, and the intrauterine douche are directly responsible for many deaths.

3. Our methods of recognizing septicæmia in the early stages are uncertain. Before we are able to diagnose the condition, the invading process has reached a stage not amenable to local treatment and the patient frequently succumbs to the intensity of the toxæmia. The treatment of septicæmia is still in its infancy.

In order that we may lower the mortality in puerperal sepsis, it is necessary that the medical attendant shall recognize and treat properly the local types of the disease and not interfere with nature's efforts to protect the patient against the invading process. Septicæmia can be traced in many instances to one or more errors of technique or obstetric judgment, and these errors can and should be avoided as our experience develops.

Abortion and labor at term are necessarily surgical procedures and are to be treated upon strict surgical principles. The employment of sterile gloves, either boiled at the time or prepared previously, are indispensable in practice. The pubic hair should be clipped or preferably shaved. No surgeon would attempt the radical cure of inguinal hernia without this preparation and yet this precaution is frequently neglected in obstetric practice. A large number of the women in this series came to the hospital with the pubic hair matted with old blood clots. A recent number of the British Medical Journal contains a review of Lea's "Puerperal Infection," and in commenting on this subject the writer says, "Does he know any English practitioner who would propose in private midwifery to shave the vulva? The practice has been followed in a few places in France with the result of provoking so much angry feelings among the public that it has been soon given up." In this country, this procedure is regarded as one of the necessary details of preparation.

It is a routine practice to give an enema at the beginning of labor in order to empty the bowel. As a result there are frequent passages of fluid material during the second stage. The danger from sepsis is increased. Colon bacilli may enter the uterus or bladder and cause serious disturbances. To avoid this soiling of the perineum, enemas should be omitted several hours before the close of the first and during the second stage of labor. When the intestines are emptied on the second day postdelivery, the urgent necessity for an evacuation is not so imperative.

Many cases of puerperal sepsis are met with following abortion and because of the retention of the decidua in the uterine cavity, the tendency to interfere locally is strong. If an incomplete abortion has occurred within twenty-four hours and the cervix is dilated, the secundines may be removed with the finger. If the cervix will not admit the finger, packing is preferred. If the uterine contents are involved in a saprophytic infection, the indication is to empty the uterus. If hemolytic treptococci are present in the lochia, the value of operative measures is questionable. The manual removal of the decidua may produce an extension of the process and lead to a fatal peritonitis.

In such cases hæmorrhage offers the only

indication for local treatment. Winter's recent report supports this assertion. In 14 cases associated with hemolytic streptococci, five died, four were very sick, and five ran a normal course after local interference. On the other hand, six cases were treated expectantly. Of these one died, one was mildly infected, and four ran a normal course. Winter has treated twenty-one cases of septic abortion expectantly in spite of fever and putrid lochia. Only one woman died and in this case, a manual removal of the placenta was effected thirty-six hours after the fœtus was expelled. I have seen many cases of sapræmic abortion with foul discharge and fever treated expectantly with excellent results. *A sapræmia associated with good drainage and uterine retraction is not to be feared* and these conditions are secured by Fowler's position and ergot.

Forced instrumental dilatation of the cervix in septic abortion (case 40) is productive of great harm. It tears the tissues and creates new foci for infection. If it is desirable to dilate, packing is by far the best treatment.

If the septic process has extended to the parametrium or peritoneum, a curettement of the uterus by the steel curette is a calamity. *The instrument has no place in puerperal sepsis.* In a recent study of the curette in abortion, the author found that the weight of authority was strongly against its employment. While the curette may remove a mass of material from the uterus, it dislodges blood clots from the sinuses, breaks down the protective wall of Bumm, and invites an extension of the infection. Watkins has recently shown that it is physically impossible to remove the entire endometrium in the non-puerperal uterus and proved the assertion in a series of thirty curettements followed by hysterectomy. In the soft and flabby puerperal uterus, the difficulty is increased. If the infection has spread to the parametrium or peritoneum, therefore, it is best to leave the uterus alone *whether empty or not.*

The use of the curette after full term delivery should never be sanctioned. It is absolutely inefficient and absolutely dangerous. Whatever detritus cannot be removed by the fingers after delivery may be left alone to come away in the discharges. In three such cases of postdelivery curettement I have seen perforation of the uterine wall, and in several others the operation was the cause of a virulent infection.

The danger from retained membranes has been greatly overestimated. Very soon after delivery, physiological retraction produces a separation from the uterine walls and the decidua are expelled en masse or come away in the lochia. In a collection of 490 cases, all the women recovered with one exception (parametric exudate) within seven days. There was no general disturbance in any case. J. Veit, however, believes that prolonged retention retards the regeneration of the endometrium and thus allows streptococci to invade the parametrium. As a general principle, attempts to remove retained membranes from the uterus *are often attended with more danger than their retention.* If the aseptic environment of the patient is satisfactory, the attempt is made to remove the membranes in the presence of hæmorrhage or complete retention. With these two exceptions, it is preferable to give ergot and to rely upon the natural powers.

Vaginal irrigations are often used as a substitute for the intrauterine douche. The object is to remove the lochial secretions that have collected in the posterior vaginal fornix. The commonly accepted indication is the foul odor of the lochia. It may be definitely stated that Fowler's position will drain the vagina sufficiently without irrigation and that *this method of therapy should be abandoned.*

Uterine irrigations are used more frequently by the general practitioner despite the warnings that have been given so often. It is sufficient to say that *they are useless and dangerous.* They increase the number and virulence of the bacteria, inflict traumatisms on the uterine musculature, and cause an extension of the infection.

Considerable discussion has been raised concerning the value of artificial uterine drainage. Gallant states that the large heavy uterus compresses the soft boggy cervix, flexing it and preventing the escape of the lochia and reports six cases of this character in which he used a bivalve uterine drain. Sinclair

recommends a glass tube held in position by a vaginal plug. The Carosa treatment is advocated by Noble and others. A sterile catheter is passed to the fundus and extends beyond the vulva and an attempt is made to provide drainage and render the uterine cavity less septic by frequent irrigations of alcohol. From an experience of several hundred cases of puerperal sepsis, I have yet to see a case where such a mechanical drain was necessary. To leave a foreign body in a septic uterus for six to eight days is of questionable value. Drainage by gauze is no drainage at all. Gauze tends to prevent rather than to promote drainage.

Posterior colpotomy is an operation of great value in selected cases. When the Douglas cul-de-sac is distended with fluid, when the localized abscess has been walled off from the general peritoneal cavity by adhesions and when the infective process has become less acute, the operation is indicated. The danger of early operation is from the trauma involved and secondary infection. In several cases I have delayed operating until it was evident that the focus was well walled off — a matter of days after the accumulation of pus — without detriment to the patient. If a pus tube has prolapsed into the cul-de-sac, it may be opened at the same sitting. Collections of pus situated high up in the pelvis *are best left alone until weeks or months after the acute process has terminated*. In cases of general exudative peritonitis without localization, draining through the cul-de-sac will remove much of the exudate and relieve the peritoneum of much of its toxic irritation.

It is useless to attempt any repair work on the lower birth canal in the presence of sepsis (case 28). If the perineum has been sutured, all sutures should be removed at once and wet bichloride dressings applied externally. Primary union is rare and a secondary operation is required.

General suppurative peritonitis is treated by drainage through the abdominal wall by many authorities, notably Bumm and Leopold and their followers. The operation must be done early. If the intestines are paralyzed, no cure can be looked for. The advantages of operation consist of a removal of the exudate, diminution of the number of bacteria, relief from pressure on the heart and lungs, a lessening of damage to the intestines, and prevention of a reaccumulation of the fluid. The operation must be done as quickly as possible. An incision is made in the median line, in both flanks, and through the cul-de-sac. A gauze drain is inserted and the patient placed in Fowler's position. Irrigating the peritoneal cavity is useless and the advice of Koblanck to separate the intestinal coils and omentum and wash out the pus is not well taken. The abdominal contents should be disturbed as little as possible. The resection of tubes and exudates in the pelvis is to be avoided (cases 20, 40, 41). Adhesions and exudates are often the safeguard of the patient and should be left alone. The opening of fresh surfaces is useless and dangerous.

While the operative treatment of general peritonitis has been followed in both this country and in Europe, the results are poor. In many cases, a non-operative form of treatment until definite localization has been determined *will give as good results as any other*.

Hysterectomy is associated with a heavy primary and secondary mortality. If the virulent process is confined to this organ, its removal is indicated but an early diagnosis is exceedingly difficult. In general hysterectomy is indicated in the following conditions:

1. Uterine traumatism, where infection is probable or already commencing.
2. Inflamed or gangrenous myomata.
3. Mortification of the fœtus in utero.
4. Severe inflammations of the uterus when purulent processes are found in the walls from which pyæmia may originate.

Wormser in a collection of 291 cases of hysterectomy for puerperal sepsis reports a mortality of 69.4 per cent in acute sepsis; hysterectomy after the pelvic veins had become involved, 68.1 per cent; in general peritonitis, 67.3 per cent; after uterine perforation, 47.6 per cent; for placental retention, 37.5 per cent and for suppurative or gangrenous myomata, 23.3 per cent.

Pyæmia is fortunately rare. The average mortality is 67 per cent. Williams lost 80 per cent by the extraperitoneal (15 cases) and 43.9

per cent by the transperitoneal route. Owing to the complicated anatomical relations of the veins in the pelvis when altered by a recent pregnancy, the technique of exsection or ligation is difficult and requires considerable experience to obtain results. For this reason, the method will not become popular in the hands of the general obstetrician. The operative mortality in acute pyæmia is heavy while many of the chronic cases recover after weeks and months under expectant treatment.

An early diagnosis of the type of puerperal sepsis is of great importance to the patient and yet the early recognition of septicæmia is difficult. A bacteriological examination of the lochia shows little. Patients may die when no hemolytic streptococci are found in the discharges and they may have but slight general disturbances when the lochia is teeming with virulent hemolytic streptococci.

The value of blood cultures is still problematical. If streptococci are found in the blood, the condition is always serious but even here cases will recover under general treatment alone. On the other hand, women die of toxæmia when cultures have been made repeatedly with negative results. A negative blood culture does not argue that streptococci are absent from the blood. Furthermore, the presence of toxins cannot be recognized by either chemical or bacteriological tests. We are obliged to rely upon the clinical course and the objective evidence offered by the patient.

Fromme's method of differentiating between pathogenic and non-pathogenic hemolytic streptococci by the lecithin-boullion test is not satisfactory. Patients have died when the recovered streptococci have grown luxuriantly in both large and small lecithin percentages, which fact Fromme originally asserted proved the harmlessness of the organism. Other cases have recovered when the streptococci were shown by Fromme's test to be most deadly. Fromme has recently modified his former statements in order to conform with the accumulating clinical and bacteriological results and definite conclusions are unwarrantable at the present time.

Serum therapy has been of little value in puerperal sepsis. Despite the glowing results obtained in England, the consensus of opinion is conservative. The different strains of streptococci and the instability of their virulence have made it extremely difficult to prepare a curative serum. The inutility of serum therapy after the secondary effects have become pronounced is at once apparent.

Collargol is no specific but may be used in certain cases. It may lower the temperature, reduce the number of chills, improve the geral condition, and promote sleep. The pulse is often reduced in frequency and strengthened in power. This favorable action of the silver salt is the exception. On the contrary, it may be followed by a rapid rise in temperature, marked increase in the pulse rate, and pronounced chills.

The author has experimented with the intravenous injection of the bichloride of mercury in eleven undoubted cases of septicæmia and lost only five patients. In the cases that recovered, the beneficial effects of the mercury were noticeable. In the others, no change was observed. Many Italian authorities have obtained favorable results from mercury. The treatment is perfectly harmless and is worthy of a trial.

Severe sepsis is characterized by a profound depression of the vital centers and these patients are unable to stand prolonged or serious operations or take much anæsthetic. If operation is indicated, it should be done quickly and the anæsthesia should be very light. Gas and oxygen or local anæsthesia are preferable.

The general treatment in all cases is of the greatest importance and consists of building up the depressed resistance of the mother. The feeding should consist of eggs, milk, beef juice, and alcohol. If the stomach is rebellious, rectal feeding is given. Relief from pain is often brought about by continuous ice on the abdomen; otherwise, recourse is had to opiates. If possible, the patient should have from six to eight hours of sleep daily but in septicæmia this is difficult to obtain. Salines per rectum and by hypodermoclysis are of value when the kidney function is weak. The drop method of Murphy is of great value in certain cases. Strychnine, digalen, and camphorated oil are indicated as cardiac tonics.

Pulse	Temp.	Resp.	Vomiting	Peritonitis	Operative Treatment	Death after Operation
108	101.2°	40	yes	local	Incision of Douglas pouch. Abscess packed.	2 days.
124	102.0°	26	no	general	Cervix dilated. Uterus curetted and tamponed.	19 hours.
80	99.4°	28	no	no	Uterus curetted, irrigated, packed.	17 days.
116	103.8°	26	no	no	Uterus curetted and packed.	8 days.
102	100.6°	24	no	no	Uterus curetted and packed.	34 days.
100	102.0°	30	no	no	Removed a quantity of blood clots manually.	11 days.
128	101.0°	50	no	general	Finger curettement.	16 days.
120	101.0°	36	no	general	Decidua removed by placenta forceps and uterus irrigated.	1 day.
104	103.2°	28	no	general	Finger curettement.	8 days.
118	100.0°	28	yes	general	Uterus curetted and packed.	6 days.
132	97.6°	30	no	local	Double salpingectomy. Pelvis drained through vagina and abdominal wall. Uterus curetted and packed.	14 hours.
118	103.8°	36	no	no	Uterus curetted, irrigated and packed. Perineum repaired.	1 day.
140	97.8°	24	yes	general	Finger curettement.	1 day.
118	101.4°	24	no	no	Attempt to dilate cervix. Laparotomy. Pelvis drained through vagina and abdominal wall.	23 days.
154	102.0°	24	yes	general	Laparotomy. Left tube removed. Pelvis drained.	9 days.
140	103.0°	32	no	general	Uterus curetted, irrigated and packed.	5 days.
110	103.0°	26	no	general	Uterus curetted, irrigated and packed.	4 days.
132	104.0°	36	no	local	Uterus dilated, curetted, irrigated and packed	6 days.

Fresh air and sunlight are of great assistance especially during the period of convalescence.

The following is a brief report of fifty fatal cases of puerperal sepsis occurring at the Cook County Hospital from August 22, 1908, to January 21, 1911. From this list are excluded a number of women who died immediately or shortly after reaching the hospital.

CASE 1. No. 379,190. Mrs. S. Age 30. Was delivered of a mature child one month ago. Under the care of a physician. Became sick two days later. Fever and pain in abdomen. Vomiting for 15 days. Typical picture of peritonitis. Abdomen distended and tender to pressure. Admitted August 22, 1908. P. 130, T. 102.8°, R. 40. Vomiting profusely. A large tender mass palpated posterior to uterus. Both fornices distended. Four days prior to operation, the pulse varied up to 108 and the temperature to 101.2° F. Operation August 27. Incision of Douglas cul-de-sac. Abscess cavity packed with gauze. Ether anæsthetic for 30 minutes. Considerable hæmorrhage from vagina.

After operation, the patient sank rapidly. Her postoperative condition was in marked contrast to the clinical picture during the previous days. Died August 29. This woman was doing fairly well under general treatment. She slept fairly well and felt well except for the abdominal pain. A localizing peritonitis was changed into a general peritonitis by the operative treatment.

CASE 2. No. 380,933. Mrs. G. Two weeks ago had an abortion performed by a midwife when ten weeks pregnant. One week later, she was curetted by a local physician. Two days before this operation, she suffered from fever, one chill, and abdominal pain. After the operation she felt much worse. Admitted September 23, 1908. P. 120, T. 101.4°, R. 30. Abdomen distended and very tender. Considerable rigidity. Patient looks septic. Talks incoherently. Cervix patulous. Uterus enlarged. No lateral findings. Purulent vaginal discharge.

Involuntaries. Operation September 26. Several hours before operation, P. 124, T. 102°, R. 26. Ether anæsthesia for 35 minutes. Cervix dilated, uterus curetted, irrigated, and packed with gauze. The same day, P. 160, T. 108.6°, R. 58. Death occurred September 27, some 19 hours after operation. The operation in this case was clearly contraindicated but the prognosis at the best was grave.

CASE 3. No. 381,020. Miss R. Age 19. Induced abortion of six weeks pregnancy. Passed a catheter herself. Two days ago was packed by a physician after severe cramps in abdomen. Admitted September 25, 1908. P. 90, T. 99.6°, R. 24. Uterus enlarged and tender. Cervix admits two fingers. Uterus contains "blood clots." Operation performed next day. Before operation, P. 80, T. 99.4°, R. 28. The uterus was curetted with the sharp curette, irrigated, and packed.

Following this operation, the infection which was evidently a mild one was aggravated. The pulse gradually rose and signs of peritonitis developed and the patient died on October 13, or 17 days later. The curettement in opening the uterine sinuses opened the way for a general infection and the patient was overwhelmed by the toxæmia.

CASE 4. No. 381,833. Mrs. L. Age 20. Full term delivery. Placenta delivered six hours later under chloroform anæsthesia by physician. The next day, a severe chill. Three days later, came to hospital. Admitted October 7, 1908. P. 120, T.

101°, R. 24. Uterus drawn to right and fixed by exudates. Foul discharge. October 9, uterus irrigated with hot iodine solution. This local treatment was repeated three times and in each single instance the condition of the patient was worse than before. On October 14, her condition was grave. Hiccough. Involuntaries and a decubitus. P. 150, T. 101.4°, R. 28. From this time, the fever varied from 102° to 105.4° while the pulse became weak and running up to 160. The patient died October 21, 1908.

The uterine irrigations (5) caused a rise in pulse and a pronounced aggravation of the condition.

Case 5. No. 383,886. Mrs. C. Age 22. Three weeks ago fell on the stairs. Two months pregnant. Began to flow the next day. No local treatment outside of the hospital. Admitted November 10, 1908. P. 128, T. 103.8°, R. 28. The following day the report was P. 116, T. 103.8°, R. 26, and the uterus was irrigated. Following this treatment the condition was P. 120, T. 104.2°, R. 30. Operation was performed on November 12, and lasted 40 minutes (ether). The cervix was dilated, the uterus curetted with a sharp curette, and packed. Two days later, the patient was much worse and at this time, the uterus was again irrigated. Four hours later, the condition was P. 132, T. 105.2°, (R), R. 38. Involuntaries. Death occurred November 20, or 8 days after operation. This patient grew rapidly worse after the irrigations and curettement.

Case 6. No. 384,242. Mrs. L. Age 30. Labor at full term. Was "packed" by a midwife. Admitted November 16, 1908. P. 108, T. 102°, R. 36. The patient was acutely maniacal. Her body was covered with bruises which were evidently self-inflicted. Pulse weak and general condition poor. Death occurred November 17, nearly 21 hours after admission. The case was one of acute septicæmia complicated by toxic mania.

Case 7. No. 385,836. Mrs. K. Age 20. The patient when ten weeks pregnant hit the corner of a table and flowed for a week. She was then curetted by a physician. Five days later, severe pain in abdomen and general condition much worse. Admitted December 10, 1908. P. 124, T. 102.4°, R. 36. The patient is very restless and does not sleep. The uterus is as large as a closed fist. Tender on pressure. Operation December 13, lasting 40 minutes (ether). Uterus curetted and packed with iodoform gauze. Before operation, P. 102, T. 100.6°, R. 24. After operation, P. 165, T. ?, R. 24. The next day, the patient was moribund. P. 146, T. 106.6°, (R), R. 26. Death occurred December 14, 34 hours after operation.

Case 8. No. 386,064. Mrs. M. Age 28. Ten days ago, the patient was curetted by a physician for an abortion. This operation was performed six days after the fœtus escaped. Admitted December 14, 1908. P. 100, T. 102°, R. 30. The patient complained of considerable pain in the uterus. The organ was boggy and about the size of a two months' pregnancy. The os was patulous. Operation December 15, 1908. A large quantity (oz. xii?) of dark decomposed blood was removed from the uterus. No curettement. The patient died December 26, or 11 days after the local interference. The peritonitis in this case was probably due to the curetting performed so late after the escape of the fœtus. The curette at this time is dangerous.

Case 9. No. 386,544. Miss T. Age 25. Induced abortion. Midwife. The patient bled for a few days and suffered from pain in the abdomen and pelvis. She appeared very weak, restless, and was vomiting. The abdomen was distended and tender on palpation. Admitted December 22, 1908. P. 156, T. 105°, R. 36. Patient is moribund and died 12 hours after her entrance to the hospital. The septicæmia was fatal in five and a half days.

Case 10. No. 391,441. Mrs. H. History of induced abortion of three months pregnancy. Physician. Two days later, abdominal pain and vomiting. Three days later admitted to hospital in stuporous condition. Admitted February 23, 1909. P. 120, T. 98.6°, R. 28. Two hours later, the record reads, P. 160, T. 98°, R. 28. The patient died on the day of admission or five days after the abortion.

Case 11. No. 394,435. Mrs. S. Age 33. Two weeks ago, labor at full term. Physician. Four days later, chills, fever, severe pain in abdomen, vomiting, and pain in the joints and back. Abdomen tympanitic, tender below navel. Second degree perineal laceration. Right elbow joint inflamed and swollen. Admitted April 2, 1909. P. 96, T. 104.6°, R. 26. The patient did well under the expectant treatment for six days, the pulse and temperature being below 100. At that time the patient collapsed and died in four hours.

Case 12. No. 399,313. Mrs. H. Age 24. One week ago a mature child was delivered by a midwife. Three days later severe pain in abdomen. The condition of the woman grew worse until admission to the hospital. Admitted June 6, 1909. P. 150, T. 104.2°, R. 52. Marked abdominal pain. Tympanitis extreme. Pulse weak and running. Extremities cold. Delirious. The patient died 20 hours after admission.

Case 13. No. 400,286. Mrs. Z. Age 29. Patient 4 months pregnant. Was "treated" two weeks ago by a midwife. This was followed by a dull pain in the abdomen, hæmorrhage, and fever. Admitted June 20, 1909. P. 128, T. 101°, R. 50. Appears very sick. Chills. Operation on the day of admission. Ether anæsthesia for five minutes. The uterus was emptied of its contents by the finger. The patient grew worse under the anæsthetic and the operation was stopped. On June 21, the patient was moribund. P. 148, T. 102.4°, R. 60. Involuntaries. Death occurred on June 22, 16 days after the first local interference.

Case 14. No. 401,608. Mrs. W. Age 24. This patient used a catheter upon herself six weeks ago. She was then six weeks pregnant. Admitted July 7, 1909. P. 144, T. 104.8°, R. 42. A physician sent

in this woman with a diagnosis of typhoid fever. A blood culture showed streptococci. The Widal was negative. Leucocytes 8,800. An abscess had developed in the left forearm and streptococci were recovered from the pus. The fever and pulse remained high until the day of death, July 11. This woman felt perfectly well for three weeks after the catheter was passed.

CASE 15. No. 402,190. Mrs. H. Age 29. The patient was admitted in a semiconscious condition with a vague history of being sick five days. Admitted July 16, 1909. P. 120, T. 101°, R. 36. General peritonitis and marked abdominal rigidity. Uterus enlarged and boggy. Profuse discharge. Leucocytes 20,600. Operation performed July 16, which lasted 15 minutes. The cervix and uterine cavity were found to be gangrenous. Foul masses were removed by placental forceps and the parts irrigated with hot iodine solution. The patient died on the following day.

CASE 16. No. 407,503. Mrs. N. Age 33. Ten days ago was delivered of a dead fœtus by a midwife. Six days later, fever and chills. Admitted October 1, 1909. P. 130, T. 105°, R. 36. Very sick. Operation performed October 2, when the placenta was removed by the fingers. Ether anæsthesia lasting 20 minutes. Before operation, P. 104, T. 103.2°, R. 28; after, P. 144, T. 103.8°, R. 36. The fever and pulse remained high. The patient moaned and cried constantly. No sleep. No vomiting. Death occurred October 10, 8 days after the local interference.

CASE 17. No. 419,715. Mrs. Z. Age 36. This woman was admitted on March 11, 1910, in an almost bloodless condition. She had been delivered four days previously and had suffered from a postpartum hæmorrhage. P. 160, T. 103.4°, R. 40. The extremities were cold and clammy. She was given an energetic stimulating treatment but died 12 hours after admission.

CASE 18. No. 420,131. Mrs. S. Age 22. Six days previously, the patient was delivered by a midwife who had considerable difficulty in removing the placenta. She finally removed it manually. Three days later a chill, high fever, and rapid pulse which continued to the time of admission. Admitted March 15, 1910. P. 160, T. 102.2°, R. 58. The patient appears septic, is icteric, foul vaginal discharge, shallow respirations, no sleep, abdominal pain, vomiting, and delirium. Death occurred 28 hours after admission. Peritonitis.

CASE 19. No. 413,143. Mrs. H. Age 28. Pregnant 8 weeks. Passed a catheter upon herself. One hour later a chill. The next day fever and pain in the abdomen. Three days later she came to the hospital. Admitted December 19, 1909. P. 118, T. 100°, R. 28. Vomiting. Operation performed on the same day. Uterus curetted and packed with gauze wet with alcohol. The patient gradually grew worse after the local treatment and died December 25 of peritonitis.

CASE 20. No. 413,288. Mrs. D. Age 39. Five weeks before admission the patient had a spontaneous (?) abortion. Admitted December 21, 1909. P. 108, T. 100°, R. 28. Patient very sick. Vomiting. Operation performed December 22. Before operation, P. 132, T. 97.6°, R. 30. The operation lasted two hours and five minutes and consisted of a double salpingectomy, opening and draining the pelvis abdominally and vaginally, curetting the uterus, and packing with alcohol gauze. The patient never survived the shock and died in 14 hours.

CASE 21. No. 417,658. Mrs. R. Age 27. Three days ago the patient was delivered by a midwife. The delivery was spontaneous. Admitted February 16, 1910. P. 88, T. 100.6°, R. 24. Three hours later, P. 138, T. 103°, R. 36. Involuntaries. Severe case of sepsis. Thromboses of veins of both legs. Parametritis and peritonitis. Death occurred February 17, 23 hours after admission.

CASE 22. No. 419,490. Mrs. S. Age 35. Was delivered 8 days ago of a mature child. Midwife. Three days later a chill, high fever, extreme weakness and pain in the abdomen. Inability to sleep. Hippocratic facies. Pulse weak and thready. Admitted March 9, 1910. P. 152, T. 100.2°, R. 40. This woman was moribund from septicæmia and died March 10, 30 hours after admission.

CASE 23. No. 420,781. Mrs. L. Age 28. Was delivered of a living child two weeks ago by a midwife. Shortly after delivery, severe pains in the back. No chill. Patient flowed four days after delivery, none since. Admitted March 23,1910. P. 90, T. 105.8°, R. 28. The pulse soon rose to 156. The patient is very fleshy, abdomen tender and rigid. No lochia. Involuntaries. Perspiration. Delirium. Death occurred March 24, 9 hours after admission.

CASE 24. No. 421,055. Mrs. W. Age 24. Was delivered 8 days ago. Midwife and two physicians. Forceps. Child died after birth. Patient sick the following day, vomiting, fever, pain in the abdomen. Admitted April 6, 1910. P. ?, T. 96.8°, R. 36. Patient is in very poor condition. Pulse not perceptible, extremities cold, abdomen typanitic, extremely tender to pressure, abdominal walls rigid. Death occurred 8 hours later from acute septicæmia with peritonitis.

CASE 25. No. 422,113. Mrs. L. Age 38. Labor occurred three weeks ago. Three days after delivery, chills and severe pains in the abdomen. At this time the uterus was irrigated and the treatment was repeated several times. Admitted April 8, 1910. P. 120, T. 102.4°, R. 36. Patient almost in extremis, brown coating over abdomen which is extremely tender, vomiting, and general prostration. Death occurred April 9, 24 hours after admission. This was a typical case of peritonitis and the condition was aggravated by the uterine irrigations.

CASE 26. No. 422,036. Mrs. M. Age 46. Two weeks ago abortion was induced by a physician. This was followed by pain, fever, and hæmorrhage which have persisted ever since. Admitted April 18, 1910. P. 102, T. 102°, R. 24. The patient is

rather stuporous, has no complaint, tongue dry and furred, subcrepitant râles and dullness in the right lower lobe of the lung. Abdomen distended and tender on pressure. Spleen not palpable. Liver enlarged. On the evening of the same day, the patient became delirious and had to be restrained from getting out of bed. Involuntaries. P. ?, T. 102.4°, R. 50. Death occurred April 22 from peritonitis and septic pneumonia.

CASE 27. No. 423,883. Mrs. G. Age 36. Three weeks ago was delivered of a mature child by a midwife. One week later severe chills followed by fever. The condition grew progressively worse until the time of admission into the hospital. Admitted April 30, 1910. Condition is grave. Marked prostration and sweating. Anæmic. Abdomen distended, tympanitic, and tender on pressure. Ulcerated area (5 by 6 inches in area) below the navel. Complete prolapse of uterus. Os dilated to one finger, moderate lochia, foul in character. Decubitus at base of spine. Marked edema of both legs and feet. P. 120, T. 106°, R. 48. The case was hopeless from the time of entrance and the patient died on May 1, or 15 days after the initial chill.

CASE 28. No. 423,920. Miss K. Age 19. Five days ago this patient gave birth to a full term child (midwife). Three days later a severe chill, fever, and marked prostration. Profuse sweating. Admitted May 1, 1910. P. 136, T. 103.8°, R. 36. The uterus reached to the level of the navel and was firm in consistency. Cervix admitted three fingers, was eroded and torn. Considerable bloody discharge. Perineum lacerated to the second degree, no sutures. Condition several hours before operation (May 3) was P. 118, T. 103.8°, R. 36. The operation consisted of a sharp curettage in which a "large amount of clots and considerable placental debris" was removed, the uterus irrigated with hot one-half per cent iodine solution and then packed. Perineum repaired. The patient took the anæsthetic badly and suffered considerable shock. Her pulse varied between 88 and 108 but was very weak and irregular. A liter of saline solution was given immediately but the patient failed to rally and died May 4 from the effects of the operation, anæsthetic, and septic prostration.

CASE 29. No. 424,475. Mrs. S. Age 25. Abortion induced by a midwife. Only the fœtus passed away. Four days later severe chills and high fever. The hæmorrhage was so severe that two physicians were called in and packed the uterus and vagina. Admission May 9, 1910. P. 114, T. 97.8°, R. 24 Pulse very weak and thready. Skin cold and blue. Emesis. Considerable bleeding through the packing. Four hours after admission, the pulse rose to 140. The uterine and vaginal packing was removed and the placental and decidual debris removed by the finger. No instruments were used and no anæsthetic was given. The temperature fell to 96° in a short time and the patient passed away May 10. The deciding factor in this case was the loss of blood that deprived the patient of all of her resistance.

CASE 30. No. 425,611. Mrs. C. Age 31. Five weeks ago, the patient induced an abortion by a rubber catheter and wire. Three days later she was curetted by a physician. This failed to arrest the bleeding and a second curettement was performed four weeks after the abortion was induced. Following this operation, the patient suffered from chills, fever, and marked weakness. Admitted May 21, 1910. P. 120, T. 98.6°, R. 32. Pulse weak and irregular. Marked anæmia. Eyes sunken. No abdominal distension or rigidity. Tenderness over the right lower abdomen. Indurated mass in right inguinal region. Vomiting. This patient lost a large quantity of blood and was able to offer no resistance to the infection. She gradually failed and died June 3. The second curettement was the deciding factor in turning the scale against the patient.

CASE 31. No. 427,255. Mrs. E. Age 35. One week ago, an induced abortion of three months pregnancy. Sick on the second day. Admitted June 11, 1910. P. 132, T. 102°, R. 54. The patient is in very poor condition. Pupils dilated. Lips cyanotic. Pain in chest and abdomen. Abdomen tympanitic and tender on pressure. Consolidation of entire right lung. Death occurred June 12 from streptococcic pneumonia and peritonitis.

CASE 32. No. 417,278. Miss F. Age 21. Attempted to produce an abortion upon herself by a catheter four weeks ago. Five days later chill, fever, and pain in abdomen. The fœtus was passed later but the decidua was retained. Her condition became worse until she came to the hospital. Admitted June 12, 1910. P. 116, T. 99.6°, R. 24. Very weak and sick. Face drawn and anxious. Abdomen distended and tender. Muscles rigid. Uterus 2 cm. above os pubis. Nothing felt in the broad ligaments. The next day, the temperature began to fall to subnormal while the pulse became rapid. Death occurred June 18. A clear case of streptococcic peritonitis.

CASE 33. No. 429,051. Mrs. S. Age 30. Was delivered 72 hours previously by a midwife. Child full term. Admitted July 5, 1910. P. 126, T. 100.2°, R. 26. Two hours later P. 140, T. 103.4°, R. 34. Vomiting. On July 6, the patient complained of great pain in the abdomen and vomited continuously. The following day, both temperature and pulse dropped and remained under 100 for three days and the patient seemed to improve. Within 8 hours the temperature rose to 107.6°, and the pulse to 160 and death soon occurred — July 10. Streptococcic peritonitis.

CASE 34. No. 430,412. Mrs. M. Age 27. A mature child was born alive and died in a few minutes. Physician in charge of the case. A midwife had given some medicine to "bring the baby," probably ergot. Admitted July 21, 1910. Patient looks very septic. Involuntaries. Abdomen tympanitic and tender to pressure. Muscles rigid. No vaginal examination made. Patient perspires profusely and is unable to swallow. P. 160, T. 106°, R. 40. Death occurred in eight hours from septicæmia.

CASE 35. No. 430,634. Mrs. F. Age 36. History of spontaneous abortion three weeks ago. Following the expulsion of the fœtus pain in the abdomen and high fever. Admitted July 24, 1910. Abdomen flaccid but tender on palpation. Uterus not palpable externally. No internal examination made. Patient complains of considerable pain in the pelvis. P. 114, T. 103.2°, R. 30. Death occurred suddenly on the following morning from embolism which originated probably from a thrombosis in the pelvic veins. The prognosis for this patient was good and she did not appear to be very sick. From the onset of the pulmonary symptoms to the exitus, the patient suffered from pain on breathing, rapid respiration, and collapse. The embolism was fatal in 20 minutes.

CASE 36. No. 430,826. Mrs. B. Age 32. Abortion 9 days ago. Attended by a midwife. Sick in bed for a week from pain and fever. Admitted August 20, 1910. P. 140, T. 104°, R. 32. Patient is delirious, profoundly septic, skin icteric, and pupils dilated. Mitral regurgitant murmur. Pulse irregular. Uterus extends 2 cm. above the pubis. Cervix very soft, admits two fingers. Profuse bloody discharge. This patient was transfused with normal saline solution combined with gtt. xv of adrenalin. Later her condition was P. 144, T. 105°, R. 32. Death occurred on August 21 from septicæmia.

CASE 37. No. 430,937. Mrs. P. Age 26. Two weeks ago the patient was delivered by a midwife. Labor at full term. Six days later chill, fever, and abdominal pain. Vomiting daily for six days. Admitted July 17, 1910. P. 140, T. 103°, R. 56. All the signs of a general peritonitis. Death occurred on July 29, from septicæmia.

CASE 38. No. 431,156. Mrs. T. Age 28. Labor 32 hours in duration. Transverse presentation. Version and extraction by physician. Three days later chill and severe pain in leg and hip. Admission six days after delivery. Admitted July 27, 1910. P. 148, T. 102°, R. 36. The uterus extends midway to the umbilicus, a little tender. Cervix admits one finger, is lacerated bilaterally. Sides of pelvis not indurated and not painful. Profuse discharge. Bedsore over sacrum. Involuntaries. No sleep since the onset of the infection. The following day the condition was desperate, P. 160, T. 106°, R. 60, and death took place August 2.

CASE 39. No. 432,589. Mrs. C. Age 32. Six weeks ago this patient had an abortion. Fever and abdominal pain developed within three days and the patient took to her bed. Three weeks later, phlegmasia alba dolens. Admitted July 26, 1910. P. 110, T. 100°, R. 36. The woman complains of severe pains in the joints and body generally. Involuntaries. August 8, a severe chill followed by an abscess in the left forearm. August 16, a chill followed by an abscess of right leg. At this time the condition was P. 162, T. 103.6°, R. 36. September 5, a chill followed by an abscess in the left knee. The strength of the patient was gradually drained and she died September 14, of pyæmia.

CASE 40. No. 434,317. Mrs. H. Age 41. Nineteen days ago, an abortion was induced by a midwife when the patient was three months pregnant. Admitted September 7, 1910. Tumor mass arising from pelvis reaches half way to the umbilicus. Resistance in both vaginal fornices. Complains of pain in right side. Does not appear very sick. P. 118, T. 101.4°, R. 24. The patient held her own for five days when she was subjected to operative treatment. An attempt was made to curette the uterus but it required too much force to dilate the cervix. A laparotomy was then made and several encapsulated pockets of foul pus were found in the left pelvis. The pelvis was then drained through the vagina and anterior abdominal wall. The operation lasted 65 minutes. The patient was given considerable morphine for a week on account of pain. Since the operation, she failed steadily and succumbed on November 4 to general peritonitis and exhaustion.

CASE 41. No. 435,672. Miss M. Age 26. Abortion induced by a physician. Operation eight days ago. Admitted September 27, 1910. P. 90, T. 98.8°, R. 20. Patient appeared to be in fair condition. A portion of the decidua was retained in utero and the woman was flowing moderately. The general condition was excellent. Operation was performed on September 27, and consisted of curettement, uterine irrigation, and tamponade. Following this treatment, the patient vomited for three days and her general condition was poor. On September 30, her condition was as follows: P. 154, T. 102°, R. 24. At this time, it was thought necessary to do a laparotomy and this was done at once. The left Fallopian tube was removed, the peritoneal cavity irrigated, and drainage through the vagina and abdominal wall secured. Following this major operation, the patient grew worse and succumbed to general peritonitis on October 9.

CASE 42. No. 440,213. Mrs. G. Age 20. Full term child born two weeks ago. Three physicians present. Forcep delivery. Three days after labor, fever, pain in abdomen, and chill. Fever for 11 days. Admitted November 26, 1910. Patient looks toxic. Face pale, lips red. Abdomen markedly distended, tympany, and general tenderness. Vaginal fornices are pushed down on both sides by a boggy swelling. Cervix closed. No discharge after fourth day postpartum. P. 140, T. 102.2°, R. 40. Patient is unable to sleep. Buttocks inflamed. On November 28, some placental debris was removed with the placental forceps, the uterus irrigated with hot iodin solution. Before this operation, the condition was P. 116, T. 101.4°, R. 28. The following day, the patient felt better though the pulse was weak. A toxic erythema was present on the abdomen and thorax. Examination made December 1, showed the abdomen distended, uterus much enlarged, lower abdomen rigid. Fornices hard and tender. P. 144, T. 105°, R. 42. A second operation was performed on December 5 with the condition standing P. 140, T. 103°, R. 32. The uterus was thoroughly

curetted with a sharp curette, irrigated, swabbed with tincture of iodine, and then packed with iodoform gauze. Following this procedure, the peritonitis developed rapidly and death occurred on December 10.

CASE 43. No. 440,849. Mrs. D. Age 22. Baby born six days ago. Placenta was retained. Removed by physician. Severe pain in abdomen, vomiting, high fever, no chills. Admitted December 5, 1910. P. 128, T. 102.2°, R. 26. Abdomen distended, rigid, and extremely tender. Operation December 7, with her condition standing P. 110, T. 103°, R. 26. The uterus was curetted with the placental forceps and a large amount of placental remains removed. Profuse hæmorrhage. Uterus irrigated and packed. Two days later, the patient became irrational, pulse 154, and involuntaries were present. Death occurred Dec. 11, from peritonitis.

CASE 44. No. 440,959. Mrs. H. Age 24. Fell from a chair against the table. Examined the following day by a physician. The next day high temperature and chill. Entered the hospital with a diagnosis of incomplete abortion and salpingitis. Admitted December 6, 1910. P. 132, T. 102°, R. 30. On the next day, a piece of placental tissue was removed from the uterus. On the following day, the cervix was dilated mechanically and the uterus curetted with a sharp curette, irrigated, and tamponed. The operation lasted 30 minutes. Before operation the condition is recorded as P. 132, T. 104°, R. 36. The patient rapidly developed peritonitis and died December 13.

CASE 45. No. 441,454. Mrs. F. Abortion was induced by a midwife. Three days later, chill and fever. Four days later entered hospital. Admitted December 13, 1910. P. 148, T. 105°, R. 48. Abdomen markedly distended. Cold perspiration. Finger nails cyanotic. Delirium. Vomiting. Death occurred December 15 from general peritonitis. The case was hopeless from the time of admission.

CASE 46. No. 442,044. Mrs. H. Age 22. Five months pregnancy. Severe chill, rise of temperature, cough, lobar pneumonia. Admitted December 20, 1910. P. 126, T. 102°, R. 40. The fœtus and placenta were expelled intact on the day of admission. The temperature fell by lysis but the pulse increased in frequency and became very weak. Death occurred on December 22.

CASE 47. No. 442,990. Miss L. Age 19. Eleven days ago gave birth to a living child. Next day, severe pain in abdomen, fever, and chills. The physician who cared for her during delivery performed a curettement on the fourth day postpartum. Since that time, the condition has been worse. Is now weak and unable to sleep. Admitted December 31, 1910. P. 120, T. 103.4°, R. 30. The patient looks septic, is icteric, and has involuntaries. Abdomen is distended. Signs of free fluid. Very tender. Cervix dilated to two fingers. Profuse discharge. This woman received the usual treatment plus serum, but she died January 2 of peritonitis.

CASE 48. No. 444,198. Mrs. H. Age 26. Spontaneous abortion. Three months pregnant. After expulsion, high fever and abdominal pain. No physician called for several days. Admitted January 14, 1911. P. 154, T. 105°, R. 32. Abdomen distended. Patient nauseated and vomiting. No sleep. Great abdominal pain. On January 15, the condition was P. 160, T. 102.4°, R. 48 and delirium. Death occurred January 16, from general peritonitis.

CASE 49. No. 444,746. Mrs. W. Age 30. Six weeks ago, a child was delivered at full term by forceps. Two physicians. Two days later, chill, fever, and prostrating sweats. Two or three chills and high fever daily. Swelling and intense pain in right leg which came on shortly after the child was born. No pain in abdomen. Admitted January 21, 1911. P. 156, T. 102.8°, R. 44. Patient looks very sick, face drawn and expression anxious. Abdomen distended, greatly tympanitic, no tenderness. Uterus firmly fixed in vaginal vault. No tenderness on either side. No distinct mass palpable. This patient had chills twice daily and several abscesses developed in various parts of the body. Involuntaries. Death occurred on January 29 from pyæmia.

CASE 50. No. 387,578. Mrs. C. Age 24. Ten days ago, the patient had a criminal abortion performed by a midwife. Severe hæmorrhage followed. Four days later, fever, chill, and abdominal pain. On the sixth day, she was curetted by a physician in the home. Her condition grew worse until admission into the hospital. Admitted February 25, 1908. P. 136, T. 103.6°, R. 26. Abdomen distended and tender. Vomiting, prostration, and involuntaries. Unable to sleep. Signs of general peritonitis. Death occurred on March 2, after several hours of wild delirium.

PUERPERAL INFECTION[1]

By THOMAS J. WATKINS, M. D., Chicago, Illinois

THIS paper is given as a part of the discussion of puerperal infection and will comprise a study of cases treated by me during the last two years. Two years ago I read a paper[2] before this Society on puerperal infection, which contained a study of sixty-one cases treated during the four previous years.

The number of cases treated in the last two years has been seventeen.

The treatment consisted chiefly in the use of measures to increase the body resistance and thus hasten "immunity." The remedies employed have been much the same as used in cases of tuberculosis to increase the physiologic resistance. The treatment will not be given in detail as that was done in my other paper. It consisted chiefly in:

1. Raising the head of the bed to promote drainage.
2. Putting an ice bag on the abdomen.
3. Giving a large amount of nutritious, easily digested food.
4. Administrating at least two quarts of fluids daily and otherwise forcing elimination.
5. Keeping the patients out of doors a part of each day when possible and giving sun baths.
6. Seeing that pain was relieved and that six to eight hours of sleep was obtained daily.

The uterus was not disturbed except for hæmorrhage or when a retained fœtus, placenta, or decidua was known to be present. When present they were removed without the use of an anæsthetic and without producing much traumatism. When the cervix was not well dilated the uterus, cervix, and vagina were packed with sterile gauze to promote dilatation, to cause separation of the placenta or decidua and to stimulate spontaneous expulsion. The objections to the use of an anæsthetic in these cases has, I believe not been sufficiently emphasized. An apparently well person often feels "down and out" and unable to take food for one or two days after anæsthesia. The deleterious effect of an anæsthetic upon an infected puerperal case is apparent. It is not so much a question of cleaning out the uterus with the finger, the placenta forcep, or the curette, as it is a caution not to produce traumatism, not to break down the leucocytic wall, and not to dislodge infected thrombi in the uterine sinuses. One should at least use as much care and intelligence in treating a uterus which contains decomposed and necrotic tissue as they would an infected sloughing wound of the hand. The most modern treatment of an infected sloughing wound of the hand is the continuous application of a non-irritating hot, wet dressing and allowing the spontaneous separation of the sloughing tissue. The uterine cavity is continually bathed in a hot physiologic saline solution and any sloughing tissue in it should be allowed to separate and escape spontaneously or at least not to be removed at the expense of giving an anæsthetic or traumatizing the tissues.

Pelvic exudates. Of the seven cases with an exudate in the pelvis no incision for drainage was made. All of the exudates had dissolved almost or entirely before the patients left the hospital. In one case the clinical history and findings suggested the presence of an infected ovarian cyst with a possible twist of the pedicle. On abdominal section, however, the mass, which was four to six inches in diameter, proved to be an inflammatory exudate involving the left broad ligament, the ovary, the tube, the pelvic colon, and numerous loops of small intestines. The abdomen was closed without disturbing the exudate. The patient made a satisfactory recovery and on leaving the hospital three weeks later conjoined palpation showed that the mass had entirely disappeared. The exudate in these cases has had little or no tendency to absorb until an immunity developed and then they have diminished in size with surprising rapidity. One can readily conceive that the exudates may be the site

[2] Jour. Am. Med. Association, Oct. 23, 1909.

[1] Read before Chicago Gynecological Society, June 16, 1911.

TABULATED REPORT OF CASES

Case No.	Supportive Treatment Only	Uterus Explored	Uterus Packed	Vaginal Section	Abdominal Section	No Pelvic Exudate	Pelvic Exudate	Suppurative Peritonitis	Temp. 103+	Temp. 103−	Length of Time in Hospital	Recovered	Died	Condition on Leaving Hospital	Duration of Pregnancy
1	..	..	..	1	..	..	1	..	1	..	5 weeks	1	..	Slight thickening	10 weeks
2	..	..	..	1	1	..	1	..	1	..	3 months	1	..	Slight thickening	10 weeks
3	..	..	..	1	..	..	1	..	..	1	1 month	1	..	Slight thickening	3 months
4	..	..	..	..	1	..	1	..	..	1	1 month	1	..	No exudate	1 month
5	1	..	..	..	..	..	1	..	..	1	3 weeks	1	..	No exudate	6 weeks
6	..	1	..	..	..	1	..	..	..	1	2 days	1	..	No exudate	3 months
7	1	..	..	..	..	..	1	..	1	..	11 days	1	..	Slight exudate	2 months
8	..	1	..	1	..	..	1	..	1	..	2 months	1	..	Slight thickening	1 month
9	..	..	..	1	..	..	1	..	1	..	24 days	1	..	No exudate	6 weeks
10	1	..	..	..	..	..	1	..	1	..	2 weeks	1	..	No exudate	Term
11	..	..	..	1	..	..	1	1	1	..	20 days	..	1	.....	4 weeks
12	..	..	..	1	1	..	..	1	1	..	6 days	..	1	.....	Term
13	..	..	..	1	..	1	..	..	..	1	2 weeks	1	..	No exudate	6 weeks
14	1	..	..	..	..	1	..	..	..	1	4 days	1	..	No exudate	10 weeks
15	1	..	..	..	..	..	1	..	1	..	12 days	1	..	No exudate	3 months
16	1	..	..	..	..	1	..	..	..	1	7 days	1	..	No exudate	6 weeks
17	..	1	..	..	..	1	..	..	..	1	7 days	1	..	No exudate	3 months
18	1	..	..	..	..	1	..	..	1	..	2 weeks	1	..	No exudate	Term
19	1	..	..	..	..	1	..	..	1	..	5 weeks	1	..	No exudate	Term
20	..	1	..	1	..	..	1	1	1	..	2 days	..	1	.....	4 months
21	..	1	..	..	..	1	..	..	..	1	18 days	1	..	No exudate	4 months
22	1	..	..	..	..	1	..	..	..	1	2 weeks	1	..	No exudate	10 weeks
23	..	..	1	..	..	1	..	..	..	1	4 days	1	..	No exudate	2 months
24	1	..	..	..	..	1	..	..	1	..	3 weeks	1	..	No exudate	Term
25	..	..	1	..	..	1	..	..	..	1	2 weeks	1	..	No exudate	5 months
26	..	1	..	..	..	1	..	..	..	1	4 days	1	..	No exudate	6 weeks
27	1	..	..	..	..	1	..	..	..	1	6 days	1	..	No exudate	Term
28	1	..	..	..	..	1	..	..	..	1	3 weeks	1	..	No exudate	Term
29	1	..	..	..	..	1	..	1	1	..	Few hours	..	1	.....	Unknown
30	1	..	..	..	..	1	..	..	1	..	5 days	1	..	No exudate	Term
31	1	..	..	..	..	..	1	..	..	1	3 weeks	1	..	Slight exudate	2 months
32	1	..	..	..	..	..	1	1	1	..	5 days	..	1	.....	Term
33	1	..	..	..	..	..	1	..	..	1	3 weeks	1	..	No exudate	10 weeks
34	..	1	..	..	..	1	..	..	..	1	10 days	1	..	No exudate	2 months
35	..	..	1	..	..	1	..	..	..	1	2 weeks	1	..	No exudate	3 months
36	1	..	..	..	..	..	1	..	1	..	12 days	1	..	No exudate	Term
37	1	..	..	..	..	..	1	..	..	1	6 weeks	1	..	Slight exudate	4 weeks
38	1	..	..	..	..	..	1	1	1	..	4 days	..	1	.....	3 months
39	..	1	..	..	..	1	..	..	..	1	12 days	1	..	No exudate	3 months
40	1	..	..	..	..	..	1	..	..	1	2 weeks	1	..	No exudate	Term
41	..	1	1	..	..	1	..	..	..	1	2 weeks	1	..	No exudate	2 months
42	..	1	..	..	..	1	..	..	..	1	3 weeks	1	..	No exudate	2 months
43	1	..	..	..	..	1	..	..	1	..	7 days	1	..	No exudate	3 months
44	..	1	..	..	..	1	..	..	..	1	1 week	1	..	No exudate	2 months
45	1	..	..	..	..	..	1	..	..	1	6 weeks	1	..	Some exudate	6 months
46	..	..	..	1	..	..	1	..	1	..	7 weeks	1	..	No exudate	6 months
47	1	..	..	..	..	1	..	..	1	..	2 weeks	1	..	No exudate	Term
48	1	..	..	..	..	1	..	..	..	1	1 week	1	..	No exudate	2 months
49	..	..	1	..	..	1	..	..	..	1	3 days	1	..	No exudate	2 months
50	..	..	1	..	..	1	..	..	..	1	10 days	1	..	No exudate	2 months
51	1	..	..	..	..	1	..	..	1	..	6 weeks	1	..	No exudate	Term
52	..	1	1	..	..	1	..	..	..	1	1 week	1	..	No exudate	10 weeks
53	1	..	..	..	..	1	..	..	1	..	6 days	..	1	.....	4 months
54	..	1	1	..	..	1	..	..	..	1	1 week	1	..	No exudate	2 months
55	..	1	1	..	..	1	..	..	1	..	2 weeks	1	..	No exudate	6 weeks
56	..	1	1	..	..	..	1	..	1	..	3 weeks	1	..	No exudate	Term
57	..	..	..	..	1	..	1	..	1	..	9 weeks	1	..	No exudate	Term
58	..	1	1	..	..	1	..	..	..	1	10 days	1	..	No exudate	2 months
59	1	..	..	..	..	1	..	..	1	..	2 weeks	1	..	No exudate	Term
60	1	..	..	..	..	..	1	..	1	..	2 weeks	1	..	No exudate	Term
61	1	..	..	..	..	..	1	..	..	1	1 week	1	..	No exudate	1 month
62	1	..	..	..	..	1	..	..	1	..	5 weeks	1	..	No exudate	Term
63	1	..	..	..	..	..	1	..	..	1	4 weeks	1	..	Slight exudate	6 weeks
64	..	1	..	..	..	1	..	..	..	1	2 months	1	..	No exudate	5 days
65	1	..	..	..	..	..	1	..	1	..	5 weeks	1	..	Exudate	Term
66	..	..	..	..	..	..	1	..	1	..	7 weeks	1	..	Exudate	1 month
67	..	1	1	..	..	1	..	..	..	1	1 week	1	..	No exudate	2 months
68	..	..	1	..	..	1	..	..	1	..	2 weeks	1	..	No exudate	2 months
69	..	1	..	..	..	1	..	..	..	1	1 week	1	..	No exudate	7 weeks
70	1	..	..	..	..	..	1	..	1	..	4½ weeks	1	..	Slight exudate	Term
71	1	..	..	..	..	1	..	..	1	..	9 days	1	..	No exudate	3 months
72	1	..	..	..	..	..	..	..	1	..	2 days	..	1	.....	Term
73	1	..	..	..	..	..	..	..	1	..	9 days	1	..	No exudate	3 months
74	..	..	..	..	1	..	1	..	..	1	4 weeks	1	..	No exudate	Term
75	1	..	..	..	..	..	1	..	..	1	7 weeks	1	..	Slight exudate	6 weeks
76	1	..	..	..	..	..	1	..	..	1	3 weeks	1	..	No exudate	2 months
77	1	..	..	..	..	..	..	..	..	1	3 weeks	1	..	No exudate	2 months
78	1	..	..	..	..	..	..	..	1	..	2 weeks	1	..	No exudate	Term
	42	10	13	10	5	40	35	6	37	41		70	8		

of a secondary colon bacillus infection and indicate incision and drainage. In my last forty-four cases, however, there has been only one where there seemed to be a logical indication for drainage.

The temperature curves have been interesting. In a number of cases there have been intervals of an increased average daily temperature for two to four days, followed by a lessened daily average temperature for a like number of days. These peculiar intervals have at times continued for two to three weeks.

Medicines. These patients have had very little medication except for the relief of pain, to produce sleep, and to move the bowels. Stimulants have not been used as rest, not action, is needed. Experience with and without the use of alcohol has induced us to believe that it is much more likely to do harm than good. When two or more quarts of liquids are not taken daily by mouth, saline enemas are used. We prescribe the saline enemas in one-half to one pint quantities two to four times daily. Experience has induced us to believe that this method is preferable to the continuous saline as it disturbs the patient less and is better retained. The tabulated report contains the sixty-one cases which were considered in my paper of two years ago and the seventeen cases treated since then. The last seventeen were hospital patients seriously ill and some of them were so ill that life seemed to be hanging in the balance. Many of them had been curetted once or twice, had been given intrauterine douches, had gotten worse, and were then sent to the hospital.

SUMMARY OF THE SEVENTEEN CASES

Admitted with pelvic exudate	7
Admitted with no pelvic exudate	10

One patient had a large gluteal abscess which was incised.

Temperature 103° plus	9
Temperature less than 103°	8

Only three of the cases with a pelvic exudate had temperatures of 103+. Six of the patients that had no pelvic exudate had a temperature of 103+.

Supportive treatment only	9
Uterus explored	3
Uterus, cervix, and vagina packed with gauze	2
Abdominal section	1

Average duration of hospital treatment was about twenty-four days.

Recovered	16
Died	1

The fatal case had multiple embolic infections and died two days after admission to the hospital. Autopsy revealed streptococci in the uterus, heart, and in exudates in the arms and legs. Of the eight deaths in the seventy-eight cases six had suppuration peritonitis, one had multiple embolic streptococcic infection and one had large multiple colon bacillus pelvic abscesses. The study of these cases would indicate that puerperal infection is not very dangerous to life.

The treatment by curettage, other operative procedures, and intrauterine medication, which has been and still continues to be quite extensively used, has however a high mortality.

HODGKIN'S DISEASE AND SARCOMA OF THE CERVICAL GLANDS[1]

A Study of the Surgical Pathology of Forty-three Cases

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THIS paper is based upon a study of the cases of Hodgkin's disease and of sarcoma primary in the cervical glands, operated upon in St. Mary's Hospital (Mayo clinic) between March 1, 1907, and September 1, 1911. A number of glands showing chronic inflammation and non-caseating tuberculosis were also examined for comparison. In studying these specimens, care was taken to tabulate the findings before referring to case records, in order to avoid the influence of former clinical or pathologic diagnoses, and in all but two instances the available data and subsequent study were in accord with the diagnoses thus made. In every case classified as Hodgkin's disease subsequent data and study have seemed to confirm the diagnosis.

It is not the custom at this clinic to operate upon malignant glands of the neck when the disease has progressed sufficiently to allow the clinician to diagnose positively sarcoma or Hodgkin's disease (except that operation is done in selected cases to relieve mechanical difficulties caused by a large tumor). For this reason the cases presented herewith are chiefly the earlier ones, i. e., cases which were not far enough advanced to permit a positive clinical diagnosis.

The forty-three cases of the series have been classified as follows:

Hodgkin's disease	15
Lymphosarcomas	14
Endotheliomas	4
Alveolar sarcomas (endotheliomas?)	4
Fibrosarcomas	2
Large round cell sarcoma	1
Perithelial sarcoma	1
Round and oval cell sarcoma on hematocyst	1
Doubtful	1
Total	43

This discussion will be devoted largely to a consideration of the findings in the first two groups, lymphosarcoma and Hodgkin's disease, and to the differentiation of the latter from non-caseating tuberculosis. The remaining groups resemble, clinically, true lymphosarcoma; hence are of more interest to the pathologist than to the clinician. Their microscopic diagnosis is not difficult.

The pathology of Hodgkin's disease and lymphosarcoma is at times so similar, and the clinical differentiation so difficult, that some authorities consider Hodgkin's disease to be a type of lymphosarcoma. On the other hand, Hodgkin's disease may so closely resemble non-caseating tuberculous adenitis that the two conditions have often been confounded; and certain authorities have discovered tubercle bacilli in glands which they considered to be Hodgkin's disease without a superimposed tuberculous process. Other investigators consider Hodgkin's disease to be a transitional stage between tuberculosis and sarcoma. Perhaps the most remarkable finding yet recorded is the presence of spirochetes in great abundance in two cases of Hodgkin's disease.

Having thus briefly explained the existing confusion regarding lymphosarcoma and Hodgkin's disease, and the confounding of the latter with tuberculosis, we will attempt to describe these conditions, and then to differentiate the three.

Hodgkin's disease may be defined, clinically, as a progressive and painless enlargement of the lymph nodes, producing, or associated with, anæmia; later accompanied by enlargement of the spleen and liver, and terminating in death. The disease usually first appears as unilateral discrete cervical glands, which remain discrete even after the glands have become generally enlarged. In none of our cases was there invasion of surrounding tissue, and two of the cases showed discrete glands which were removed at a fourth operation. It is said that in the later stages of the disease, the spleen shows a fibrosis and lymphoid proliferation, with

[1] Read before the Southern Minnesota Medical Association, Rochester, August, 1911

Fig. 1. Case A35707. X170. Fibrosarcoma. Very cellular tumor composed of irregular spindle cells.

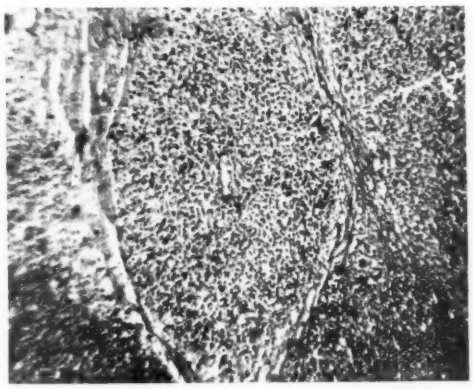

Fig. 2. Case A34384. X84. Perithelial sarcoma. Oval cells apparently arising from vessel wall.

consequent enlargement; and that the lungs, liver, and kidneys also show a proliferation of lymphoid tissue:—facts which have not been confirmed in this series since there have been no opportunities for autopsy. The microscopic picture of our cases corresponds closely to that described by Dorothy Reed: (1) proliferation of large, quite typical endothelioid cells, (2) production of numerous multinucleated giant cells, (3) progressive fibrosis, and (4) abundance of eosinophilic cells. (Figs. 9 and 10.) The cases in this series do not show any of the necrosis which other observers have described, nor do any of the cases show invasion of surrounding tissue; a point which has been noted elsewhere. The microscopic picture of Hodgkin's disease may vary greatly, due to the pressure of the progressive fibrosis. This picture resembles so strongly a reaction to some irritant that we must consider the possibility of the enlargement being the result, rather than the cause, of systemic disease—a hypothesis suggested further by the fact that the glands recur after operation, and recur as discrete glands. The growth of the glands is not like that of a malignant tumor in that they are definitely encapsulated, do not metastasize, and, in general, do not show vegetative characteristics. It should be

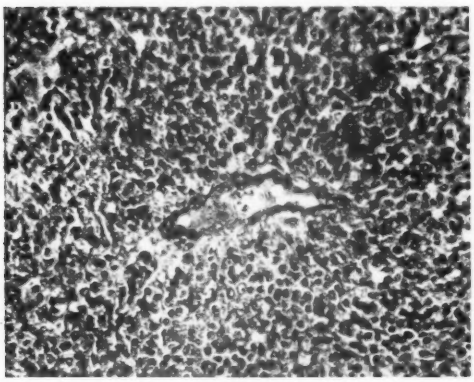

Fig. 3. Case A34384. X170. Perithelial sarcoma. Oval cells apparently arising from vessel wall.

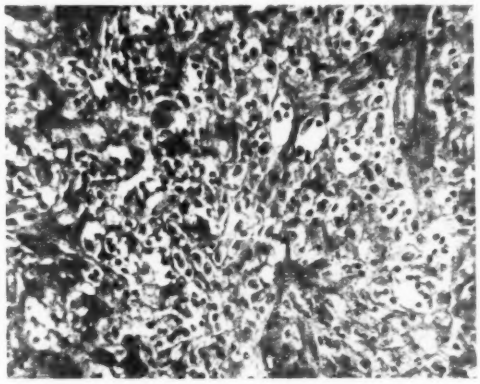

Fig. 4. Case A45826. X170. Endothelioma. Endothelial cells diffused through gland.

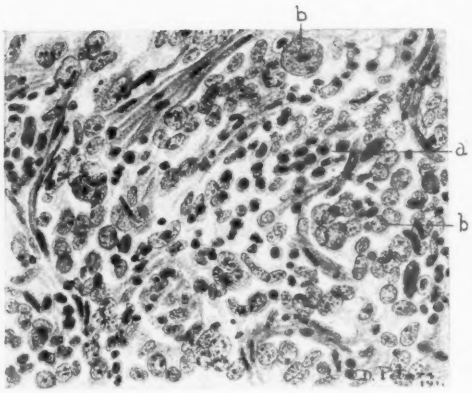

Fig. 5. Endothelioma. X300. a, lymphocytes; b, endothelial cells.

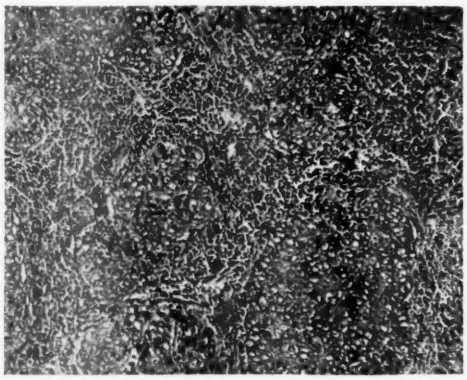

Fig. 6. Case M3120. X84. Alveolar sarcoma. Sarcoma (endothelioma?) cells grouped as in carcinoma.

noted, however, that they do show some fo the characteristics of malignancy in that they recur after operation, that they are associated with anæmia, and that the disease terminates in death.

Lymphosarcoma, as we use the term, is the most common type of primary sarcoma of the lymph nodes. Its cells are round, rather small, with scant protoplasm, and have nuclei showing marked metachromatism. A fibrosis is uniformly present and in some cases is very extensive. The microscopic picture suggests lymphoid tissue as the probable origin of the tumor.[1] The cases in this series have followed closely the course described by other writers: the glands at first being discrete, later fusing and invading the surrounding tissues; but, clinically speaking, they do not often metastasize below the shoulder girdle.[2] Recurrence after operation appears as a diffuse tumor.

Non-caseating tuberculous lymph nodes removed surgically are apparently quite unusual. It may be interpreted in one of

[1] This picture occurs in tumors primary in lymphoid tissue and should not be called "small round cell sarcoma." The latter, which may arise in any connective tissue, is composed of a very scant reticulum supporting deep staining, closely packed cells, which are almost indistinguishable, morphologically, from lymphocytes. They show a tendency to grow along the vessels and to metastasize early.

[2] Adami (Prin. of Path., vol. 1, 2d edit.) says "It (lymphosarcoma) is a small round celled growth, difficult to distinguish from the ordinary small round celled sarcoma, but differing in the growth being purely local and infiltrating."

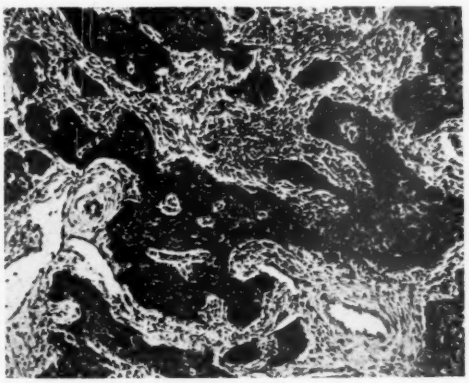

Fig. 7. Case A36892. X84. Alveolar sarcoma. Sarcoma (endothelioma?) cells grouped as in carcinoma.

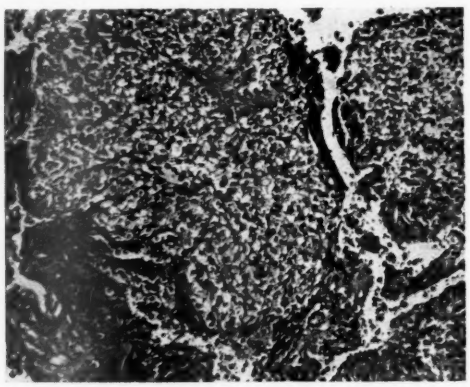

Fig. 8. Case A19116. X84. Round and spindle celled sarcoma arising on hematocyst.

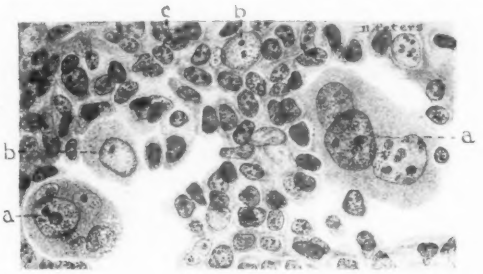

Fig. 9. Hodgkin's disease. X650. a, a, Hodgkin's disease giant cells. b, endothelial cells. c, lymphocyte.

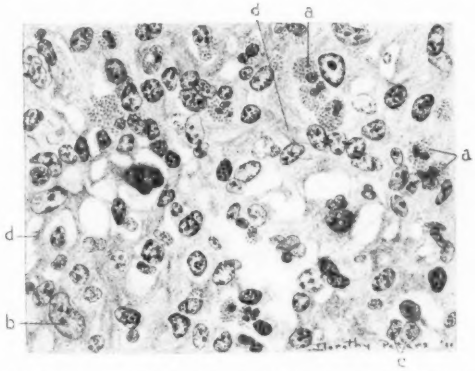

Fig. 10. Hodgkin's disease. X650. a, eosinophiles; b, endothelial cell; c, lymphocytes; d, fibrosis.

three ways: (1) invasion by an organism of low virulence, (2) high resistance to infection, or (3) the process is not sufficiently advanced to show necrosis. More than three hundred specimens of glands removed surgically were examined in connection with this series, and each case of an inflammatory nature, which showed no caseation grossly, was studied microscopically. Every tuberculous specimen showed areas of necrosis or caseation in at least one gland, although in several cases numerous sections were necessary in order to demonstrate it. If but one or two non-caseated glands are submitted for examination, the diagnosis is very difficult and often impossible. The diagnosis must be expressed as inflammatory reaction alone without diagnosis of etiology. The writer does not believe that an opinion can be given with certainty unless caseation or tubercles are found, and if these conditions are not found, bacteriologic methods should be employed in making the diagnosis. The microscopic appearance of the endothelial proliferation found uniformly in such a case is very suggestive. This proliferation is extensive, and the cells, which grow in masses throughout the gland, are closely packed and often compressed by the fibrous tissue reaction into spindle cells. The appearance is so characteristic that, in the examination of a large number of glands, the tuberculous cases can be classified with considerable accuracy by this feature alone.

The points which seem to be of greatest value in the differential diagnosis of these conditions may be summarized as follows:

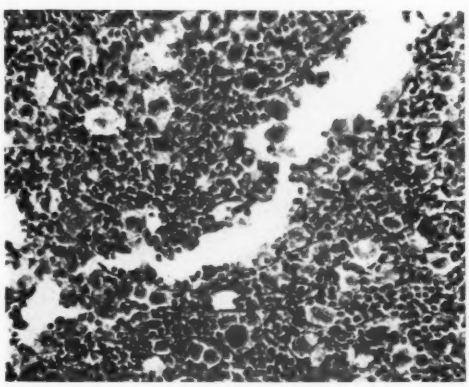

Fig. 11. Case A7580. X170. Hodgkin's disease. Showing endothelioid proliferation under low power. Stroma scant.

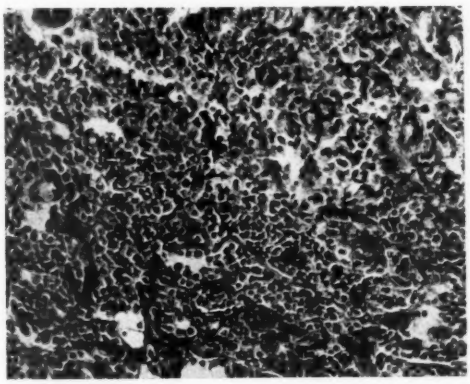

Fig. 12. Case A3701. X170. Hodgkin's disease. Showing more advanced fibrosis. Endothelioid cells not numerous.

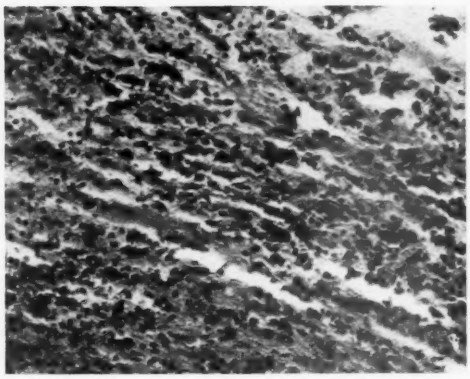

Fig. 13. Case A38818. X170. Hodgkin's disease. Late stage, showing very extensive fibrosis. Diagnosis made from a more typical field in same slide.

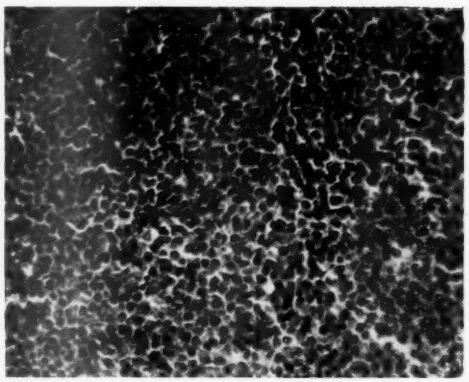

Fig. 14. Case A22420. X190. Lymphosarcoma. Very scant stroma. Typical sarcoma cells.

In Hodgkin's disease the endothelial proliferation shows very large cells, usually isolated, or few together. These cells are easily distinguished under the low power of the microscope. Giant cells are often quite numerous, and tend to be of a characteristic type, with nuclei heaped together in the center of the cell, and with relatively little protoplasm. The fibrous tissue reaction is rather typical on account of its uniformity, its frequent tendency to hyalinization, and its apparently progressive nature. The eosinophilic cells are also typical, but in our series of cases do not appear to such an extent as Dorothy Reed has described. Nevertheless, they may be found so numerous that one must think of some positive chemotactic relation between the cells and the eosinophiles. No eosinophilia or other characteristic blood picture has been observed in this clinic.

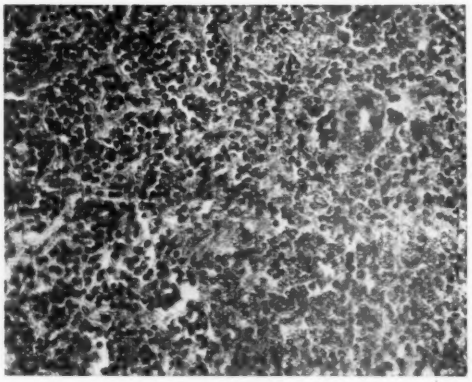

Fig. 15. Case A9926. X170. Lymphosarcoma. Stroma increased, cells rather small, some endothelial proliferation.

In lymphosarcoma an endothelial proliferation may be found, but the proliferation resembles that of an early inflammatory reaction. A fibrous reticulum is always present and this feature may, in certain cases, resemble closely Hodgkin's disease. The cells of the sarcoma are comparatively uniform in size and the large isolated endothelial cells, characteristic of Hodgkin's disease, are lacking. Giant cells are not usually seen.

Tuberculous glands, if carefully examined, almost invariably show necrosis and caseation. The fibrous tissue reaction is often extensive. If neither tubercles nor caseation are found, the diagnosis cannot be made with certainty by histologic study, although the appearance of the endothelial proliferation is very suggestive. The giant cells of tuberculosis do not resemble those of Hodgkin's disease, since they are larger, have nuclei peripherally arranged, and are surrounded by a zone of endothelial cells.

On going over these cases with their initial clinical diagnoses one finds that the clinicians made a positive, correct diagnosis in only one-third of the cases, which shows the difficulty of early clinical diagnosis. However, it is only fair to emphasize two points:

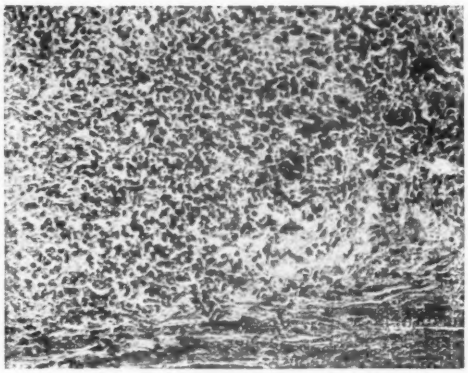

Fig. 16. Case A15463. X170. Lymphosarcoma. Fibrosis extensive, lymphoid tissue almost unrecognizable.

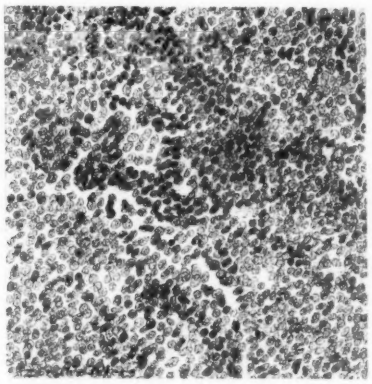

Fig. 17. Lymphosarcoma. X300. Note relatively uniform appearance of sarcoma cells.

first, that a correct clinical diagnosis might have been made in every case could the clinician have waited for the further development of the disease; second, that the cases in which diagnosis was considered certain were not treated surgically and hence are not considered in the study. A brief tabulation of our statistics is herewith attached.

	Hodgkin's[3] Disease	Lympho-sarcoma	All Sarcomas	All Cases
Number of Cases	15	14	28	43
Males	9	12	22	31
Females	6	2	6	12
Average age (years)	28.6	41.7	36.6	34.4
Before 35 years	12	4	12	24
After 35 years	3	10	16	19
Onset to operation (months)	22.7	16.1	20.2	21.1
Correct clinical diagnosis	4	5	8	12
Positive clinical error[1]	3	2	4	7
Axillary involv. alone noted	4	1	1	5
Axillary and inguinal involv. noted	6	1[2]	1	7
Number recently heard from	11	10	22	33
Dead	6	7	14	21
Recurrence after radical operation	4	3	7	11
No recurrence after 2 years	1	0	0	1
Exp. of life from onset (months)[3]	36.6	19.7	16.3	23.6
Number known to be alive, August 15, 1911.	5	3	7	12
One to two years	0	3	3	3
Two to three years	0	0	1	1
Three to five years	2	0	0	2
More than five years	3	0	3	6
Number whose date of death is known	5	4	10	15
Less than one year	1	1	2	3
One to two years	2	2	6	8
Two to three years	0	1	1	1
Three to five years	1	0	1	2
More than five years	1	0	0	1

[1] Diagnosed as non-malignant conditions.

[2] General Sarcomatosis, with skin metastases. Classification as a lympho-sarcoma is open to doubt.

[3] These figures have only a relative value, since they are based necessarily on the patients dead, i. e., probably the more malignant cases.

The following conclusions are based on the result of this study:

1. Hodgkin's disease, lymphosarcoma, and tuberculosis, present three different pathologic pictures, and run three different clinical courses, i. e., are probably three distinct entities.

2. Early clinical differential diagnosis between chronic adenitis, tuberculosis, Hodgkin's disease, and lymphosarcoma is practically impossible.

3. While the advisability of radical surgical treatment of sarcoma or Hodgkin's disease may be questioned, yet in any case of doubt one or more glands should be excised and submitted to a competent pathologist.

4. Hodgkin's disease runs a slower course than sarcoma.

5. Hodgkin's disease is more common before the age of 35 and lymphosarcoma is more common after the age of 35.

6. The prognosis is very grave in both Hodgkin's disease and sarcoma of the cervical glands.

REFERENCES

COLEY. Annals of Surgery, vol. xlvii, p. 127.
CROWDER. N. Y. Med. Jl., vol. lxxii, p. 445.
STERNBERG. Zeitschrift für Heilkunde, bd. xix, p. 21.
WHITE. Jl. A. M. A., vol. xlix, p. 775.
SIMMONS. Jl. Med. Re., vol. ix, No. 4, p. 378.
REED. Johns Hopkins Hos. Reports, vol. x, p. 133.
GIBBONS. Am. Jl. Med. Sci., vol. cxxxii, p. 692.
MACCALLUM. Trans. Assoc. Am. Phys., 1907.
ADAMI. Prin. of Path., vol. 1, 2d Ed.

ACUTE EDEMA OF THE CERVIX IN PREGNANCY[1]

With Report of a Case

By CHARLES E. PADDOCK, M. D., Chicago, Illinois

ACUTE edema of the cervix in pregnancy is possibly a rare condition; at least, there are but few cases reported. Perhaps many cases are overlooked, because the mass may not protrude through the vulvar orifice and because no pain accompanies the condition. There is a normal edema of the cervix in pregnancy which comes on during the first six weeks and remains without further enlargement during pregnancy. Any enlargement beyond this should be considered abnormal.

The writer has seen but one case of acute edema of the cervix and will report briefly the same:

Mrs. A., VI para; aged 35; healthy. First four pregnancies and confinements normal. During the fifth pregnancy and at the end of the fifth month the patient's attention was called to a mass, the size of her fist, protruding from the vulva. Examination showed this mass, elastic, dark red color, which at first view reminded one first of the placenta, and then of a cyst or polyp; in fact, it seemed impossible to decide the true condition merely upon inspection. Previous to this there had been for a few hours quite a discharge of a clear fluid, and later a sero-sanguineous fluid. At the time of examination there was a discharge of blood which might be considered a hæmorrhage. Examination showed the mass to be connected with the uterus, and probably the cervix itself. The patient was put to bed, hips elevated, and in twelve hours the tumor had disappeared, at least from view, and hæmorrhage stopped. Several times later in the pregnancy the same condition recurred, with the same clinical phenomena. It was possible to say with certainty that the anterior lip of the cervix was the part most involved.

Labor was normal, and the cervix involuted perfectly.

After an intermission of two years, with regular menstruation, pregnancy again occurred. There was a repetition of the edema, as in the former pregnancy, with the exception that labor occurred during one of the attacks. Because of the hæmorrhage, it became necessary to hasten the delivery, which was fairly easily done. The tumor rapidly disappeared, and the cervix has remained normal.

Jolly has reported one case of acute edema of the cervix, as follows:

II para; first pregnancy normal; aged 22. Present pregnancy was normal up to the seventh month, when suddenly, without demonstrable cause, a fleshy tumor, the size of a fist, appeared at the vulva, and disappeared entirely after two days. At term it again appeared, larger than before, and not receding spontaneously. A physician was called, who made a diagnosis of a cyst and referred the patient to the clinic. Here Jolly made the diagnosis of pregnancy at term. O. D. P., child living. At the vulvar orifice a tumor presented, which was of elastic consistency, dark reddish color, and not sensitive to touch or pressure. Upon internal examination he found the tumor to be the greatly lengthened and thickened anterior lip of the cervix. Therapy—hot compresses—the tumor disappeared from vulvar orifice in seven hours, although persisting in the vagina, and somewhat interfering with the progress and mechanism of labor Within a few days after labor the tumor had disappeared entirely

Geyl has only been able to collect ten cases in the literature, but in none of these cases, in contrast to my own, had there been any edema of the cervix in the previous or subsequent cases. As to the exciting cause of this condition we are much in the dark. In only one case, that of Seitz (Centralblatt f. Gyn., 1905), was it shown that the condition was induced by purely mechanical causes. In his case the tumor appeared at the eighth month. The patient, feeling the presence of a foreign body at the vulva, though herself in labor and summoned a midwife, who incised the tumor, thinking it to be the membranes. The patient bled severely and when help arrived from the clinic the woman was almost exsanguinated. A tampon checked the bleeding and a diagnosis was made. Examination revealed the presence of large fecal masses in the rectum. The bowels had not moved for seven days. Upon removal of the fecal masses the edema disappeared within a few hours. Patient, upon recovery, was allowed to return to home, with the strictest

[1] Read before the Chicago Gynecological Society, May, 1911.

injunction to keep the bowels open. However, after a short time the patient was again unable to move the bowels, and after three days the edema recurred again, only to quickly disappear after large masses of fecal matter had been removed from the lower bowel. In this case there seems to have been a decided relation between the obstinate constipation and the edema.

Zeigler (General Pathology) says that "According to the etiology, we distinguish four varieties of the edema, namely, the edema of stagnation, inflammatory edema, hydremic edema, and edema ex vacuo. The edema of stagnation is the result of a partial stagnation of the blood circulation. If a flow of venous blood be interrupted, the fluids of the blood escape from the vessels. The amount escaping increases in proportion to the degree of discrepancy between the inflow and outflow of blood, and is therefore increased by an increase in the afflux of blood. The immediate result of an increased transudation is an increased flow of lymph, and this may suffice to carry all of the fluid off. If this does not suffice, the fluid collects in the tissues and we have a condition of edema."

According to Landerer, "The occurrence of this condition is favored by the fact that the elasticity of the tissues becomes diminished in consequence of the long continued increase of the pressure to which they are subjected."

The lymph vessels have an elaborate anastomosis and obstruction to the flow is not easy, and when one considers the lymph supply of the uterus, it is evident that the lymph theory does not apply in the case in question. The lymph passes through the uterus from the mucosa, through the musculature to the serosa; here it collects in the lymph spaces adjacent to the larger vessels. The lymph is distributed partly in the large descending veins and partly in the lumbar trunk of the thoracic duct. In order to produce a stagnation in the veins, much mechanical influence must be exerted. It is not shown in the case reported above that there was any mechanical influence, neither was there any clinical evidence of it. Obstruction to the flow of lymph is not ordinarily followed by edema. When all the lymphatics of an extremity are shut off, dropsy does not necessarily occur, provided the lymph formation remains the same, because the blood-vessels are able to take up the lymph.

While lymphatic obstruction may not cause edema itself, it might increase edema already produced by excessive transudation from the blood-vessels.

The constitution of the vessel wall determines to a great extent the amount and character of the fluid which escapes.

"Fluids secreted from the capillaries and mingled with the products of tissues and metabolism is taken up by the lymphatics and returned to the veins. There is an equilibration between this transudation and lymph secretion. This equalization may be disturbed, and there is then an oversaturation of the tissues with transudated fluid. The amount and color of the fluid vary." In the case reported there was a large amount of at first translucent and then bloody fluid, amounting to serious hæmorrhage.

Notwithstanding the probability that the same etiological factors may not enter into every case, the treatment, at least preventative, seems to be to remove mechanical influences. In those cases with a relaxed abdominal wall and a tendency to anteflexion or anteversion, a properly fitted support or corset should be worn. Constipation should be corrected. In the acute stage the knee-chest position and elevation of the foot of the bed seem to offer the best solution for the reduction of the tumor. In labor the Trendelenburg position may be necessary

CARDIAC CHANGES SECONDARY TO UTERINE MYOMATA[1]

By PHILIP S. DOANE, M. D., Chicago, Illinois

DURING the growth of a uterine myoma a toxic element develops which produces changes in the cardiovascular system. The myocardium is most commonly affected.

Just what this toxic element is, is as yet unknown and as far as I can learn no definite study of the subject has been undertaken. The too frequent postoperative deaths in myomatous cases demand that we give this subject our earnest and thoughtful attention.

It is now recognized that all uterine myomata should be removed if the growth causes symptoms of pressure, or if it shows signs of degeneration, or if hæmorrhage occurs with its resulting secondary anæmia.

The fear of degenerative changes taking place in the tumor itself, or the actual appearance of symptoms denoting these changes, is the chief factor which has heretofore determined the choice for an early operation.

Operators of experience now go still farther and think it advisable to remove this form of tumor when first recognized, regardless of symptoms. Hysterectomy or myomectomy should be performed in all cases in which the tumor is found after the fortieth year; myomectomy, if possible, in all cases occurring during the childbearing period.

The mortality rate in this country, in uncomplicated cases, now about two per cent, is being constantly lowered.

In complicated cases, however, the rate is much higher.

An estimate of the rate in this latter class can not be accurately computed, because in most instances the cause of death is given as due to some complication which has not made itself apparent until death, and is in no way directly connected with the tumor or its previous development.

Pathological changes occurring in other organs secondary to the growth of uterine myomata have not been given sufficient consideration. Kidney changes are not uncommon and are often associated with any growth appearing in the abdomen or pelvis. Cardiovascular changes associated with the development of uterine myomata are too frequent, to call them mere coincidences.

The Germans and French first called our attention to these cases, but Dr. H. J. Boldt (1) in 1905 wrote an exhaustive article on the subject and reported thirty-seven out of seventy-nine of his private cases as having shown these changes before operation. He also states that "It is exceedingly difficult sometimes to diagnosticate cardiac changes clinically; they may be suspected if there are present respiratory disturbances without demonstrable pulmonary lesion" and "Further, that such patients should be advised to have the tumor removed; cardiac and renal changes, unless hopelessly advanced, being an indication rather than a contraindication for their removal, because it also seems that patients who have myomata succumb more readily to cardiac insufficiency if attacked by an intercurrent disease."

J. Clarence Webster (2) about the same time, reported a series of two hundred and ten myomatous cases treated surgically in which he found cardiovascular changes in 25 per cent. Another paper on this subject from a man of so vast an experience should add greatly to our list of cases and also throw more light upon the subject.

Fleck (3) in a study of three hundred and twenty-five cases in which the heart was examined found one hundred and thirty-three exhibiting heart symptoms. Of this latter number forty-six gave no history of atypical bleeding.

This same author had occasion in one instance to examine, postmortem, the heart of a case in which no cardiac change had been demonstrable during life. The heart itself showed no gross changes, but microscopically, very decided changes were shown, resembling those found in brown atrophy.

[1] Inaugural Thesis, Chicago Gynecological Society, Read May, 1911.

Kelly and Cullen (4) report ninety-two of their cases as giving data indicating impaired heart action, but in the majority of these a definite history of profuse uterine hæmorrhage was obtainable. They favor the theory that the secondary anæmia was the chief factor in causing the impaired action of the heart.

Winter (5) had an opportunity to study fifty-two postmortems of myomatous patients, a majority having died after an operation for removal of the tumor. He found but eight normal hearts, yet he states that the cardiac changes must have been due, in the majority of them, to infections, anæmia, and other causes.

Williams (6) in thirty autopsies in myomatous women found the condition of the heart as follows: six valvular disease, five fatty degeneration, three hypertrophy and dilatation, three atheroma of aorta, one small heart, twelve normal.

M. Hofmeier (7) reports a case of fatty degeneration of the myocardium in a myomatous woman dying without operation.

Saenger (8) mentions two cases coming to autopsy, one showed brown atrophy of the heart, the other fatty degeneration.

Carl Hennig (9) had two cases in which the heart symptoms entirely cleared up after the removal of the tumor.

Charles G. Cumston (10) quotes numerous cases cured after the removal of the tumor. He shows quite conclusively that the size of the tumor bears no direct relation to the intensity of the heart symptoms.

Samuels (11) agrees with Baldy in the opinion that fibroid disease of the uterus is not a mere local disease, but a general one, since it involves organs, and that fibromyomata uteri and visceral degeneration may be caused by the same factor.

Noble (12) says "The relation of fibroid tumors to degenerative changes in the myocardium and in the blood-vessels is a problem which as yet is not definitely settled, the occurrence of brown atrophy and of fatty degeneration of the heart, of fibroid changes in the arterioles, of secondary degeneration in the kidneys, and of changes in the circulation, blood-vessels and blood, leading to thrombosis and embolism, have all been ascribed to the influence of fibroid tumors on the economy. The evidence is satisfactory that all of these secondary changes do occur, but the percentage and mode of their occurrences is not definitely known."

J. L. Miller (personal communication) has seen several cases and gives an interesting and definite report of one with history:

> Age 45. Always excellent health, no chorea or rheumatism. One child twelve years of age. Complained of palpitation and decided dyspnœa on exertion. Examination showed heart apex 12 cm. from midline of sternum. Systolic murmur at apex. Pulmonary second sound accentuated. Liver enlarged and tender, due to passive congestion. Heart action irregular and arhythmic. The findings were those of myocarditis. Moderate anæmia due to menorrhagia.
>
> The patient remained in bed two months with improvement. Later there was a relapse upon her getting about. The uterine fibroid was then removed and all symptoms disappeared. The patient has remained well during the two years since operation.

E. C. Dudley (personal communication) has observed many cases exhibiting heart symptoms before the removal of a myoma of the uterus and he now takes the precaution to place such cases at rest for a necessary length of time before operating.

James A. Harvey (personal communication) reports five cases in which cardiac changes were found in myomatous women. In one of his cases he performed a myomectomy during the fifth month of pregnancy, the patient having a mitral regurgitation at the time. Pregnancy continued to full term with normal delivery. In the same case two years later a second myoma was removed in the fourth month of pregnancy with the same result as in the first instance.

Peter Bassoe (personal communication) places at my disposal a postmortem history in which a woman of 65 died of organic heart disease, the anatomic diagnosis being fibrous mitral endocarditis with calcification, slight fibrous myocarditis, concentric hypertrophy of left ventricle, dilatation of left auricle, etc., etc., with multiple uterine fibromyomata.

My personal observation of these cases has extended over a period of twelve years during which time numerous cases have been observed in both personal practice and that of

others. During the past two years a closer study of the cases has been made and the definite conclusion reached that the heart symptoms are not mere coincidences but actually due to the myomata. Hæmorrhage is present in the majority of cases, yet, as a prime factor, it is excluded, because the same symptoms appear in myomatous women who give no history of bleeding.

Cardiac changes are most marked in women with a neurotic tendency. These same changes seem to bear no relation to the size of the tumor, its position in the pelvis, their multiplicity or character. Therefore my belief that the etiology can in some way be traced to a toxin formed during the development of the growth in the uterus.

The following case illustrates the above assertion:

Mrs. J. K., aged 45; married for twenty years. Family history negative. Personal. Always enjoyed good health. Menstrual history normal. One miscarriage (forced) at third month, fourteen years ago. No inflammatory disturbances after, yet she did not again become pregnant. Her distressing symptoms began one and one half years ago with general nervousness, palpitation, and sleeplessness. Constipation first noted at this time. The palpitation increased and she was compelled to sleep in a semisitting position. There were no pressure symptoms until three months ago. No nausea, but she vomits easily. Menstruation normal. Easily chilled and extremities "blue" most of the time. Slight edema was noted above ankles.

Examination. General yellowish tinge of skin. Flesh firm and abundant. Slight bulging of lower abdomen above pubis. No unusual tenderness found in abdomen or pelvis. No tenderness over region of gall-bladder or liver. Liver slightly enlarged. No ptosis noted. In outer upper quadrant of right breast a tumor mass, circular 6 cm. in diameter was found. No depression of nipple and no marked tenderness. This growth was first discovered six or seven years before and has grown slowly. Lungs negative. Blood pressure 145. Urinalysis negative.

Pelvic examination. Cervix low down and forced upwards against floor of bladder. Uterine outline not obtainable. A multiple tumor mass was found filling pelvis and extending upward to umbilicus. No bleeding or discharge from cervical canal.

Examination of heart made by Dr. Murray Washburn was as follows: Apex 4½ cm. from median line. Slight border dullness midsternum. Pulse 84 and regular but upon exercise increased to 144, gradually decreasing in ¾ of a minute to normal. Slight blowing systolic murmur at apex which was moderately increased by exercise. Sound of murmur conducted as far as mid-axillary line but not heard in back.

Blood examination showed: Hemoglobin, 100 per cent, erythrocytes, 4,344,000, leucocytes, 7,500, small mononuclear, 40 per cent, large mononuclear, 6 per cent, neutrophiles, 6 per cent, polymorphonuclear, 48 per cent.

Abdominal hysterectomy performed at St. Joseph's Hospital January 31, 1911, through median line incision. Uterus amputated above cervix. Multiple myomata found developing in uterine wall and attached to it by short pedicles and filling entire pelvis. One mass adherent to appendix. The right ovary was found normal and with little impairment of vascular supply. It was sutured to cervical stump.

Abdomen closed without drainage. Convalescence rapid and normal. Pathological findings showed uterine tumor to be fibromyomata with no degenerative foci, while breast tumor was a simple adenofibroma.

At this writing the patient is enjoying unusual health with no symptoms of any cardiac disturbance whatever.

Another case of the hæmorrhagic type operated upon during the past winter gives an interesting history.

Seven years ago while returning from California over the Northern route, patient experienced marked dyspnœa and palpitation while in the higher altitudes. Two years ago she began to flow profusely semimonthly. One year ago palpitation, shortness of breath upon exertion, sleeplessness, etc., was first noticed.

In November, 1910, a uterine myoma was found and myomectomy performed, the tumor being of the soft variety and very vascular. Convalescence was somewhat protracted due to marked anæmia and general neurotic condition of the patient. To-day, however, this same patient is in California, having traveled, with no symptoms of cardiac disturbance, over the same route taken seven years ago. She is automobiling through mountains, taking long walks and climbing the foothills, yet experiencing no disturbance such as she had before the removal of the tumor.

Of eleven cases treated personally during the past two years, ten exhibited cardiac disturbances. This experience has led to a more careful study of the subject and is the incentive for the plea that more accurate observation be made and that the internist be called upon to examine these cases with us before the operation, if the slightest symptoms of cardiac disturbance has been shown. The postoperative mortality will be reduced to a marked degree if such a plan is followed.

The following is a brief report of a few of these cases:

CASE 1. Age 22. Profuse menstruation since thirteen years of age. For two years previous to discovery of tumor marked dyspnœa, palpitation, and at times pain in precordial region noted. Heart enlarged, apex beat misplaced, pulse arhythmic. Anæmia marked. Removal of tumor with uterus and adnexa. Very neurotic for one year after, but cardiac symptoms improved.

CASE 2. Age 59. Uterine fibromyomata diagnosed sixteen years before. Repeated attacks of myocarditis since that time. Menstruation ceased at 50 with no hæmorrhage after and gradual atrophy of tumor. Acute angina pectoris one year ago ending in death. No autopsy obtainable.

CASE 3. Age 48. Soft myoma of uterus. Frequent and profuse bleeding. Marked anæmia. Mitral stenosis. Death from pneumonia third day after onset.

CASE 4. Age 40. Uterine fibroid with cyst of right ovary. Unable to perform usual household duties because of heart disease. No hæmorrhage. Dilated heart with irregular pulse. Myocarditis. Tumors removed and return of normal health and freedom from "heart disease."

CASE 5. Age 42. Pedunculated fibroid arising from fundus. No uterine bleeding and menstruation normal. No cardiac symptoms at time diagnosis of uterine growth was made, and operation not advised by consultant. Six months later she had an attack of acute bronchitis with a left-sided pleurisy. A myocarditis followed but improved after two months of rest. At the present time she is confined to her bed with a second attack of myocarditis. Tumor causes no pressure symptoms, no hæmorrhage, and has shown little growth in size since first discovered.

The following report given me by Dr. Arthur A. Small after a careful examination of this patient May 7, 1911, shows the condition of the heart as it is to-day.

"On inspection, there is seen to be a rather diffuse indefinite wavy impulse at the apex. On palpation this is felt chiefly in the fifth interspace but to a small extent in the sixth interspace and the maximum apex thrust is 12 cm. from the midsternal line. There is no thrill or shock to be felt.

"On percussion, heart dullness commences to the left in the anterior axillary line. On the right, heart dullness can be procured 2 cm. to the right of the lateral sternal line. Dullness at the base of the heart commences at the third interspace.

"On auscultation, the first sound is shorter and much more valvular in tone than normal. There is a soft systolic blow heard at the apex. This is traceable outwards for a distance of about 5 cm. There are no murmurs at the base.

"There is a pronounced arhythmia, the heart dropping a beat every five to ten seconds. The pulse varies from 52 to 94 and is intermittent in character; many of the missed pulse waves corresponding to the asystole, while at other times, the pulse skips a beat, due evidently to an abortive systole. The lines can be felt 5 cm. below the costal margin."

Observation shows the myocardium to be primarily involved as a general rule. Hence suitable treatment, with rest as the chief agent, will prepare the patient for the operation to follow.

The study of this subject leads us to make the following deductions:

That uterine myomata are dangerous growths at all times and demand removal if secondary symptoms are not too aggravated. That too little attention has been paid to the secondary symptoms and that the assistance of the trained specialist is not called upon frequently enough. That if operation be resorted to, it be done with speed. That the anæsthetizer be well trained and informed of any complication. That the heart be carefully watched after the operation.

And furthermore, we must give these cases more careful attention, keep accurate records of them, and call upon the physiological chemist to help us isolate the toxic element causing these complications.

BIBLIOGRAPHY

1. BOLDT, H. J. Uterine myofibromata and visceral degeneration. New York Medical Journal, October 28, 1905.
2. WEBSTER, J. CLARENCE. A consideration of fibroid tumors of the uterus, based upon a study of a series of 210 cases treated surgically. American Medicine, vol. ix, p. 401, March 11, 1905.
3. FLECK, GEORG. Archiv. f. Gynakol., vol. lxxi.
4. KELLY AND CULLEN. A recent work on myomata of the uterus. 1909, pp. 414; 421; 423–426; 451–456.
5. WINTER, GEORG. Die Wissenschaftliche Begruendung der Indikationen zur Myomoperation. Zeitschrift fur Geburt. und Gynæk., 1905, vol. iv. p. 49–154.
6. WILLIAMS, W. R. Uterine tumors; their pathology and treatment. p. 106–109. New York, W. Wood & Co., 1901.
7. HOFMEIER, M. Zur Lehre vom Shock. Zeitschrift fur Geburt. und Gynæk., 1885, vol. xi, p. 366. Zeitschrift f. Geburt. und Gynæk., 1885, p. 371.
8. SAENGER. Centralblatt f. Gynæk., 1884, p. 589.
9. HENNIG, CARL. Zeitschrift f. Geburt. und Gyn., vol. xxix, pp. 131, etc.
10. CUMSTON, C. G. Cardiac disease and uterine fibromata. New York Medical Journal, October 28, 1905.
11. SAMUELS, A. Fibromata Uteri. New York Medical Journal, May 28, 1910.

Bibliography touching upon this subject may be found in the following references:

BALDY, J. M. The mortality in operations upon fibroid tumors of the uterus. American Journal of Obstetrics, September, 1905, vol. lii, p. 370.
CULLEN, ERNEST K. So-called spontaneous focal myocarditis and the occurrence of calcification of the degenerate muscle fibers. Johns Hopkins Hospital Bulletin.
FENWICK, BEDFORD. On cardiac degeneration from the pressure of abdominal tumors. The Lancet, London, May 26, 1888, p. 1015.
KISCH, E. H. Uterus und Hertz, in ihren wechselbeziehungen. (Cardiopathia uterina.) Leipzig, G. Thieme, 1898.
LEOPOLD, G. Die operative Behandlung der Uterusmyome durch vaginale Enucleation. Archiv fur Gynæk. Berlin, 1890, bd. 38, S. I.
PELLAND. La mort par fibramoyomes uterins. Paris, 1905.
STRASSMAN AND LEHMANN. Zur Pathologie der Myoerkrankung. Archiv fur Gynæk., 1898, vol. lvi, No. 5, p. 593.
STRUMDORF, ARNOLD. The clinical manifestations of uterine fibroids, as indications for early operative intervention. Medical News, New York, February 11, 1905.
WEST, JAMES N. Uterine fibromata, their pathological significance, diagnosis and treatment. Post-Graduate, New York, January, 1910.
YOUNG, E. B. AND WILLIAMS, JOHN T. The frequency and danger of fibroids of the uterus. Boston Medical and Surgical Journal, May 12, 1910.

RICHTER'S HERNIA

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RICHTER'S hernia may be defined as an abdominal hernia in which a portion of the circumference of the gut is imprisoned, reducing, but not entirely obliterating, the lumen of the intestine.

This rupture could hardly be called rare, but it is far from being a common ailment. Very brief space is devoted to it in text-books upon general surgery, yet it is a condition with a high mortality that could be reduced with prompt treatment, and for that reason if no other, deserves much more prominence than it has received. It is largely through the excellent paper of Treves upon this subject that I am able to present data concerning the history and symptomatology.

The credit for the proper comprehension of the subject has been bestowed upon Littré by the French, who, by the way, continue to write of it as Littré's hernia. In 1700 he described a "new form of hernia," but the cases reported were examples of hernia of Meckel's diverticulum. He believed the condition developed within the hernia sac was the result of pressure or obstruction, and stated that it was characterized by abdominal pains, prostration, absence of meteorism, constipation, hiccough, slight but never feculent vomiting. Johannes Meckel, about a century later, showed that Littré's cases were strangulation of the diverticulum which bears Meckel's name.

Louis, in 1757, described a strangulation of part of the gut's circumference, but his cases did not fit his theory, and was based largely upon the fact that some cases of strangulated hernia were converted into fecal fistulæ which healed spontaneously.

It was not until 1778 that the hernia that we are now considering was described in its clinical and pathological entirety, and to Gottlieb Richter the honor is due. He termed it "small rupture."

Richter's hernia is more common in women than men, more prevalent in the fifth decade, and the majority are of the femoral variety upon the right side. In the cases collected by Treves, 50 per cent were not suspected or recognized in life, and death occurred in all of those cases. Old herniæ give rise to the condition more frequently than recent ones, and the reducible are associated with this particular rupture more often than the irreducible. The lower portion of the ileum is more prone to become engaged than any other portion of the bowel and the part constricted may amount from one-third to four-fifths of the circumference. In some cases, the lumen of the gut allowed fecal circulation, while in others, only a director could be passed through the constriction. It is well to remember, as pointed out by Scarpa, that if two-thirds of the circumference of the gut or more is strangulated, passage of water through the gut

is arrested by angulation of the bowel. The portion of the intestine opposite the mesentery is generally affected.

We lack authentic knowledge pertaining to the formation of this hernia, but the following explanation seems most tenable: in an old or reducible hernia, an adhesion takes place between a small portion of the gut and the sac. The apex of this cone cannot escape and becomes strangulated at the ring, so that the entire circumference is not engaged. This theory would be acceptable except for the fact that in more than half the cases, no adhesion existed at the time of the operation. My explanation is purely conjecture, but seems to me worthy of consideration. It is noteworthy that the cases occur beyond middle life, the average age being 53 years. It is not impossible that some of the fibers of the muscular wall of the intestine become atonic, or even rupture from pressure from within or without, so that a diverticulum is created. This pouch may become engaged in a hernial ring and muscle spasm complete the strangulation. It is quite probable that the cause of strangulation and formation of the partial hernia occur from the same cause at the same time.

The symptoms have little uniformity and are unreliable and misleading. The gravity of the case is dependable chiefly upon the condition of the bowel, but of the latter condition, we have no symptom or group of symptoms that serve as an index to the intestinal viability. In one-third of the cases, the symptoms are typical of strangulated hernia and all cases have some symptoms suggestive of this condition.

Pain is likely to be diffused over the entire abdomen and colicky in character. Occasionally, it may be localized over the hernial ring involved. The delusive calm of the toxæmia which attends the severe cases may be present, and is of the same significance as in intestinal obstruction from other causes.

Vomiting is generally present, but frequently is of a mild or intermittent type. Fecal vomiting is present in about 12 per cent of the cases, the earliest being on the second day and the latest on the eighth day of the reported cases, but the bowel may be gangrenous without stercoraceous vomiting.

Constipation has not been present in all cases, but is rather a consistent symptom. In a few cases, diarrhœa has been a feature and is a bad omen. Absolute obstruction is not unusual. In other words, obstipation is the general rule, but any degree from diarrhœa to stasis may be present.

Gaseous distension is never exaggerated, and in a large proportion of cases is not marked at all. It is possible to have a constriction that is water tight but not air tight.

When a tumor can be determined by palpation, it usually presents the characters of a strangulated hernia. In about half of the cases no tumor was found. In one of my own cases, after the abdomen was opened and diagnosis made of Richter's hernia of the femoral type, no tumor could be felt at the base of Scarpa's triangle.

I am not aware of blood analysis in any case, and I am skeptical as to the value of it as an aid in diagnosis. The variation of the leucocyte count under identical clinical conditions reduces the value of this means of diagnosis to a mere probability.

From what has preceded, it is hardly necessary to add that the diagnosis is extremely difficult. With a palpable tumor in a hernia area, obstruction and little distension, we can entertain a diagnosis of Richter's hernia.

The prognosis depends upon several factors, but more especially the condition of the bowel, and unfortunately, this is often unknown. Some idea of the relative mortality can be gathered from Treves' tabulation. Gangrene was present in twenty-eight out of fifty cases in which the condition of the bowel was stated, and of these twenty-eight cases, twenty-one were femoral. Twenty-nine of thirty-eight cases of femoral died, three of twelve inguinal were fatal, and one of two ventral succumbed. The operative mortality was 55 per cent, the non-operative 75 per cent, but of the recoveries of the latter class, each had an artificial anus. No case of femoral recovered without operation.

There is but one treatment,—operation. The bowel should be dealt with as in ordinary cases of strangulation, and the radical cure of hernia done if the patient's condition warrants it. A case is reported (Jones, Lancet,

London, 1904, i, 1281) in which the gangrenous gut was invaginated. This is only possible when the area involved is less than half the circumference of the gut, and even under any condition, the superiority of this method is open to criticism. I wish to report the following cases:

CASE 1. Miss D., 55 years, occupation clerk. Previous history is of no importance. She had been in excellent health some years before this illness and was never aware of a hernia.

Her present illness began December 16, 1908, and was attributed to the exertion of hanging curtains and stepping from a trunk. Just after getting down, she experienced a sharp pain in the right groin which increased with such severity in an hour or two, that she summoned her physician, who saw her about 11 A. M. She vomited at frequent intervals during the day and continued to complain of pain and emesis during the night. The attending physician visited her twice between 8 P. M. and 6 A. M., but little or no relief was afforded. Her bowels did not move on the first or second day of this illness. The persistence of the vomiting, which became feculent on the afternoon of the second day, alarmed her physician and she was sent to the hospital, where I saw her about 2 P. M. Vomiting and distinctly stercoraceous at this time, her abdomen was a little distended and the pain was diffuse. No tumor was detected. She was anæsthetized and the abdomen opened in the median line. No constricted or twisted bowel was seen, but in sweeping the hand about the abdomen, the bowel was found apparently attached to the parieties in the lower right quadrant. Inspection by retracting the wound showed that the bowel was not adherent, but had partially escaped into the femoral canal. It was my opinion then that I had overlooked a case of strangulated femoral hernia, and external palpation was made to confirm it, but much to my surprise, no tumor could be felt. It was evident that we were dealing with a small piece of strangulated gut. An incision was made parallel to Poupart's ligament, the sac exposed and opened, and the intestine liberated. The bowel was drawn down for inspection. About four-fifths of the circumference had been sequestrated and suffered from the circulatory inactivity, but the color improved in a few moments. The remaining one-fifth was of hyperæmic only. An artificial diverticulum had been formed which so narrowed the lumen of the intestine as to prevent the fecal current but allowed escape of gas. The operation for the radical cure of femoral hernia was done and the abdominal wound closed. Her recovery was without incident.

CASE 2. J. S., 48 years, male, plasterer by occupation.

Previous history. There is little in his life that has any bearing on hernia, for which he came to the hospital for treatment.

Present illness dates from January, 1909, when he noticed a swelling in his right groin, not succeeding violence or any indiscretion. It was reduced by a physician and he was told that he had a hernia. No further inconvenience was experienced until June of the same year, when he fell from a windmill. The hernia reappeared. His own efforts to reduce it were unavailing and he visited a physician who met with no better success. The pain was intense, and, becoming unbearable, he applied to the hospital for admission.

Examination on admission, June 30, 1909. His pulse was 80 and temperature 99.8°. He was suffering from pain in the right groin but did not appear to be very ill. Examination of the region revealed a tumor about the size of a pigeon egg, expansile upon coughing, painful upon pressure, and below a line drawn from the anterior superior spine, to the spine of the pubes, and about one-half inch to the inner side of the femoral artery.

His bowels moved during the afternoon. He had no abdominal distension or vomiting. A diagnosis of irreducible hernia, caused by recent adhesions was made, and the patient was ordered prepared for operation on the following day, but the interne was asked to observe him closely in the meantime, especially in reference to gastro-enteric symptoms and the pulse rate.

The operation, performed under local anæsthesia, showed about one-half the circumference of the ileum projecting through the femoral ring and strangulated. It was cyanotic but by releasing the constriction and adding hot salt solution, the color revived.

A small quantity of fluid was within the sac and there were no adhesions.

The bowel was restored to the abdomen, a Bassini's operation for femoral hernia done, and the patient returned to bed. The convalescence was ideal.

OBSTETRIC SURGERY AT THE PRESTON RETREAT[1]

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IT is through the courtesy of Dr. Richard C. Norris, with whom I am associated, that I have the pleasure of making this clinical report of the work at the Preston Retreat. It is a report of the major and minor obstetric surgery that has been met with in four hundred consecutive deliveries at the Retreat. In this group of cases, the following operations were performed:

Forceps were used thirty-one times; labor was induced twenty-three times; pubiotomy was performed once; Cæsarean section, eight times; abdominal section for ectopic pregnancy after full term, in one case; the placenta was manually removed in one case; the uterus was explored and douched in six cases; in three cases, the uterus was curetted, and in seven cases the uterus was douched without further manipulation; the intrauterine pack was employed twice — for postpartum hæmorrhage, and vaginal tampon in one case of placenta prævia; in one case an abscess of Bartholin's gland was excised: the posterior cul-de-sac was excised and drained in one case. There were thirty-nine primary and seven secondary repairs of the perineum.

FORCEPS

The application of forceps is indicated in cases where the mother or infant is in danger, or their best interests are served by hastening the termination of labor. Used judiciously and carefully, they are great aids. Too often, however, they are applied early in labor, before complete dilatation of the cervix, and, in a pelvis whose dimensions are not known. In contracted pelvis, which concerns us most, no greater mistake can be made than the application of forceps to the floating head.

Major obstetric operations have almost relegated the Tarnier axis-traction forceps to the museum, and to-day, the case of contracted pelvis under observation a sufficient length of time, will rarely, if ever, need their application.

Forceps applied before moulding has taken place cannot be too strongly condemned, and fœtal mortality will be much reduced by a more careful study of relative disproportion and the proper method of treatment in individual cases. It is the policy of the Retreat, to give nature ample opportunity to secure moulding and fixation of the head, and while the axis-traction principle is used in all forceps deliveries, the Tarnier instrument is more and more discarded for the Simpson axis-traction forceps.

Forceps were applied thirty-one times; axis-traction on the fixed head, twelve times; the low operation with axis-traction, nineteen times.

As will be seen in Table A, of the thirty-one cases, six infants were stillborn, three infants died within the first three days of life. The deaths, however, when analyzed, show that:

1. In one case the cause of death was a prolapsed cord.
2. In one, the mother was eclamptic.
3. In two, the infants (twins) were premature, the labor was terminated for acute hydramnion.
4. In three cases the infants died within three days: one from aspiration pneumonia; one was a monster; one was from toxæmia, the mother being in state of coma for two days.

INDUCED LABOR

The induction of premature labor is certainly a procedure of considerable importance, and its field of usefulness is not so limited as some obstetric surgeons would have us believe. The justly increasing field of usefulness of major surgery has not altered Dr. Norris' convictions as to the usefulness of inducing labor in properly selected cases.

In moderate disproportion between fœtal head and the pelvis; in the grave toxæmias; in the prolongation of pregnancy; and, in fact, in those conditions wherein the continuance of pregnancy would jeopardize the mother or infant, we resort to the induction of labor. It is in certain definite cases of

[1] Read before the Philadelphia Obstetrical Society, June, 1911.

TABLE A. FORCEPS

Case No.	Indication.	Head Fixed; Axis Traction; Forceps.	Low.	Mother.		Infant.		Remarks.
				Mortality.	Morbidity.	Mortality.	Weight.	
	FLAT PELVIS.							
6443	Flat pelvis and prolapse cord; 9 cm.	1				Stillborn	8 lb, 7 oz.	
6505	Flat pelvis at term; 10 cm.; c. v.	1				Living.	7 lb, 3½ oz.	
6515	Contracted pelvis; previous Cresarean; 9¼ cm.; c. v.	1				Living.	7 lb, ½ oz.	
6405	Contracted pelvis; 9¼ cm.; c.v.	1				Living.	7 lb, 4 oz.	
6521	Contracted pelvis; 8¾ cm.; c. v.	1				Living.	5 lb, 9½ oz.	
6724	Contracted pelvis; 8¾ cm.; c. v.	1				Living.	7 lb, 15 oz.	
6404	Contracted pelvis; 8¾ cm.; c. v.		1			Living.	7 lb, 15 oz.	
6648	Contracted pelvis. 9¼ cm.		1			Living.	8 lb, ½ oz.	
6703	Contracted pelvis; 9¼ cm.; c. v.		1			Living.	8 lb, 15 oz.	
6734	Contracted pelvis; 9 cm.; c. v.		1			Living.	8 lb.	
6401	Flat; rachitic.	1				Living.	9 lb, 4 oz.	
6481	Contracted pelvis; justominor; 8 cm.	1		0	0	Living.	7 lb, 6 oz.	
	UTERINE INERTIA.							
6628	Uterine inertia with fibroma.	1				Lived two days (pneumonia)	8 lb, 4 oz.	
6714	Inertia.	1				Living.	8 lb, 8 oz.	
6409	Inertia.		1			Stillborn.	7 lb, 11 oz.	In labor 6 hrs.
6458	Inertia.		1			Living.	6 lb, 15 oz.	
6524	Inertia.		1			Living.	6 lb, 3 oz.	
6544	Inertia.		1			Living.	6 lb, 1 oz.	
6578	Inertia.		1		1	Living.	6 lb, 1½ oz.	
6610	Inertia.		1			Died 2d day.	6 lb, 15½ oz.	
6686	Inertia.		1			Living.	7 lb, 7 oz.	
6735	Inertia; R. O. P.		1			Living.	4 lb, 8 oz.	
6375	Inertia.		1			Living.	7 lb, 8 oz.	
6389	Inertia.		1			Living.	8 lb, 11¾ oz.	
6422	Inertia.		1			Living.	8 lb, 13 oz.	
6787	Inertia.		1	0	0	Living.	7 lb, 15 oz.	
	OTHER CAUSES.							
6744	Hydramnios.		1	0	0	Stillborn (premature)	2 lb, each	
6784	Eclampsia.	1		0	0	Lived three hours.	4½ lb.	
6752	Eclampsia.		1	0		Stillborn	4 lb.	
6641	Grave albuminuria.		1			Living.	7 lb, 3 oz.	
6540	Prolongation of pregnancy; floating head.	1			1	Died (difficult forceps)	10 lb.	
6443	Flat pelvis and prolapse cord.	1				Stillborn.	8 lb, 7 oz.	

contracted pelvis that the induction of labor has been selected. In cases of the lesser degrees of pelvic contraction that have been under our care for a sufficient time to have carefully studied the pelvis, it has eliminated those difficult high-forceps deliveries which are so dangerous to infants. No doubt, induction has been performed unnecessarily in some of the cases at the Retreat, but the error is surely on the safe side. Our tables, even though the numbers are rather small, still are of interest. Labor was induced eleven times for contracted pelvis (the conjugate vera diameters ranging from 8½ cm. to 10 cm.). There was no infantile mortality and no maternal morbidity. In two cases of grave toxæmia labor was induced; one child died within a few hours, the other infant survived. In one case of eclampsia labor was induced, and the infant was stillborn. In eight cases of prolonged pregnancy labor was induced, and two infants (one natural delivery and one forceps) were lost. In not one case of contracted pelvis did the decision to induce labor before term, in preference to some other operative procedure, prove to be unwise.

In multiparæ, the history of previous or trial labors is of the utmost importance. In primiparæ, it is quite different. Knowing that a great percentage of children will be born even when the degree of contraction is marked, should make us hesitate to hastily decide upon a major operation.

Induction is called for in the lesser degrees of pelvic narrowing when a floating head of normal size cannot be pushed into the contracted pelvis. In deciding upon induction it is inadvisable to do so before the thirty-sixth week. When the overlapping is marked, the final decision is arrived at by estimating the relative size of head and pelvis. This is best done under an anæsthetic, one hand grasping the head, the index finger of the other hand in the vagina, with the thumb of same hand placed at the junction of the head and the pubic bone. This is Kerr's modification of Müller's method.

In all such cases that have been under observation sufficient time before term to carry out our idea, we have lost no babies, nor have we had one difficult forceps case. Forceps are applied after the mother has done her best to facilitate delivery by moulding, which is far safer than the early application of forceps, and there is no greater menace to babies than their too early application.

The method used was the ordinary rectal tube first spoken of by Dr. Little of Montreal, in 1909. In one or two cases the Voorhees and Pomeroy bags were used. Where haste is an item, the Pomeroy bag is preferred.

TECHNIQUE

The external genitalia are cleansed with tincture of green soap and bichloride. A 1 per cent lysol, or bichloride (1–4000) vaginal douche is given.

The cervix is grasped by a double tenaculum and drawn down. A finger is passed through the cervix, the lower uterine segment is explored, and the membranes are gently separated within reach of the finger. The finger used as a Hegar dilator can always pass the internal os after the thirty-sixth week. Some few minutes are often required for this. A bivalve speculum is placed in the vagina, and the tube passed by aid of a long dressing or placental forceps, or it can be inserted by touch alone. When the latter method is used, a hole is made in the rectal tube at such a distance from the introduced end, that when a stylet is passed through this into the tube as a guide, the end of the stylet will be about an inch from the end of rectal tube to guard against the sharp point puncturing the membrane. With the finger of the left hand in the cervix, the tube is guided and pushed off the stylet, each time withdrawing the stylet the distance the tube was inserted, not allowing the stylet to pass beyond the internal os. The entire tube, with the exception of an inch or two, is placed in the uterus and held there by a vaginal tampon of iodoform gauze and a sterile "T" binder; both tube and gauze are pushed out by labor pains. The gauze would be removed in twenty-four hours if labor did not, in the meantime, commence. The tube could easily remain longer, possibly forty-eight hours; if then unsuccessful, a Pomeroy bag would follow. Not once have the membranes been punctured. The rectal tube is, I think, preferable in all cases where

TABLE B. INDUCTION OF LABOR (23 Cases in all).

GRAVE TOXÆMIAS (3 Cases).

Case No.	Indication.	Para.	Period.	History of Previous Labor.	Method.	Conj. Vera.	Type of Pelvis.	Duration.		Infant.	
								Labor Began.	Labor Terminated.	Weight.	Condition of Birth.
6428	Grave albuminuria. Prolongation of pregnancy. Floating head	1	Four weeks after estimated term.		Bougie. Natural delivery.	11 cm.	Normal.	After 9¼ hrs.	After 19¼ hrs.	8 lbs.	Living.
6752	Toxæmia (comatose).	1	Four weeks before term.		Rectal tube. High forceps upon fixed head.	11 cm.	Normal.		12 hrs. 50 min.	4½ lbs.	Lived 3 hrs.
6784	Eclampsia		Three weeks before term.	One normal. Two miscarriages.	Rectal tube. High forceps upon fixed head.	11 cm.	Normal.		21½ hrs.	4 lbs.	Dead.

CONTRACTED PELVIS (11 Cases).

6774	Contracted pelvis.	1	Seven days before estimated term.		Rectal tube.	8½ cm.	Obliquely contracted.	15 hrs.	22 hrs.	6 lbs. 10 oz.	Living.
6768	Contracted pelvis. Head floating.	1	Ten days before term.		Rectal tube. Natural delivery.	9 cm.	Simple Flat.	15 hrs.	31¼hrs.	6 lbs. 10 oz.	Living.
6734	Contracted pelvis. Floating	1	At term.		Rectal tube. Low forceps.	9 cm.	Simple Flat.		After 47 hrs.	8 lbs.	Living.
6724	Contracted pelvis. Floating head.	1			Rectal tube. High forceps upon fixed head.	8½ cm.	Simple Flat.	6⅗ hrs.	After 35 hrs.	7 lbs. 15¼ oz.	Living.
6591	Contracted pelvis. Marked over lapping of head.	1	Two weeks before estimated term.		Rectal tube. Natural delivery.	9¾ cm.	Simple Flat.	At once.	After 21¾hrs.	8 lbs. 8 oz.	Living.
6703	Contracted pelvis. Head floating.	1	At term.		Rectal tube. Low forceps.	9½ cm.	Simple Flat.	33 hrs.	After 37 hrs.	8 lbs. 15 oz.	Living.
6723	Contracted pelvis. Head floating.	6	At term.	Forceps with first. Baby living. Three miscarriages at third month.	Rectal tube.	8¾ cm.	Justo-minor.	Immediately.	After 4¼ hrs.	7 lbs. 8 oz.	Living.
6495	Contracted pelvis. Floating head.	2	Ten days past estimated term.	Forceps with first.	Rectal tube. High forceps upon fixed head.	9¼ cm.	Flat. Rachitic.	7 hrs.	After 24⅗ hrs.	7 lbs. 4 oz.	Living.
6505	Contracted pelvis. Floating head.	1	At term.		Rectal tube. Pomeroy bag. High forceps upon fixed head.	10 cm.	Justo-minor.	24 hrs.	After 36 hrs.	7 lbs. 3½ oz.	Living.
6515	Contracted pelvis. Floating head.	3	Three weeks before estimated term.	First induced labor eighth Month. Infant lived 30 hrs. Weight, 6 lbs. 6½ oz. Naturaldelivery. Second Cæsarean section, 7¼ lbs., living.	Norris dilator. Pomeroy bag. High forceps upon fixed head.	9¼ cm.	Justo-minor.	At once.	After 9 hrs.	7 lbs. 8 oz.	Living.
6531	Contracted pelvis. Floating head.	1	Four weeks after estimated term.		Rectal tube. Natural delivery.	9½ cm.	Simple Flat.	20½ hrs	After 53 hrs.	7 lbs. 11 oz.	Living.

TABLE B. INDUCTION OF LABOR—CONTINUED.

PROLONGATION OF PREGNANCY (8 Cases).

Case No.	Indication.	Para.	Period.	History of Previous Labor.	Method.	Conj. Vera.	Type of Pelvis.	Duration.		Infant.	
								Labor Began.	Labor Terminated.	Weight.	Condition of Birth.
6428	Grave albuminuria. Prolongation of pregnancy. Floating head	1	Four weeks after estimated term.		Bougie. Natural delivery.	11 cm.	Normal.	After 9¼ hrs.	After 19¼ hrs.	8 lbs.	Living.
6540	Prolongation of pregnancy. Floating head	1	Four weeks after estimated term.		Rectal tube. High forceps.	11 cm.	Normal.	6 hrs.	After 75 hrs.		Dead.
6551	Prolongation of pregnancy.	5	Six weeks after estimated term.	Two at full term. Two miscarriages. 6 mos. and 2½ mos.	Voorhees bag. Natural delivery.	9 cm.	Justo-minor.	8 hrs.	After 28 hrs.	8 lbs.	Dead.
6554	Prolongation of pregnancy.	1	Seven weeks after estimated term.		Rectal tube. Natural delivery.	10¼ cm.		20 hrs.	After 28 hrs.	7 lbs. 8 oz.	Living.
6566	Prolongation of pregnancy.	1	Four weeks after estimated term.		Rectal tube. Low forceps.	11 cm.	Normal.	6 hrs.	After 25½ hrs.	9 lbs. 12 oz.	Living.
6601	Prolongation of pregnancy.	2	Two weeks after estimated term.	One miscarriage at third month.	Rectal Tube. Voorhees bag. Natural delivery.	9¾ cm.	Simple Flat.	At once.	After 13 hrs.	8 lbs. 13 oz.	Living.
6638	Prolongation of pregnancy.	3	One week after estimated term.	One miscarriage second month. Forceps second pregnancy. Baby lived one day.	Rectal tube. Natural delivery.	11 cm.	Normal.	48 hrs.	After 54 hrs.	7 lbs. 11 oz.	Living.
6639	Prolongation of pregnancy. Floating head	1	Three weeks after estimated term.		Rectal tube. Natural delivery.	11 cm.	Normal.	7 hrs.	After 37 hrs.	7 lbs. 3 oz.	Living
6744	Acute hydramnios with twins.	2	Sixth month of gestation.	Forceps with difficult delivery. Baby died in three hours.	Voorhees bag and Bossi.	9¼ cm.	Simple Flat.	No active pains at any time.	25 hrs.	2 lbs. each.	Living.

Average time to deliver multipara 24.72 hours. Average time to deliver primipara 33.66 hours.

no immediate haste is necessary, for the following reasons:

The total bulk of coiled rubber in the lower uterine segment is almost equal to that of a bag and is quite sure to excite uterine contraction.

It is less likely to displace the presenting part than a Voorhees or any non-yielding bags of similar design. The tube is bulky, but easily compressed by the presenting part.

It is easily introduced without an anæsthetic, does not require preliminary dilatation, and is very reliable.

PUBIOTOMY

Mrs. E. Case 6481. Pelvic measurements. Iliac crest, 27 cm.; iliac spine, 25 cm.; external conjugate, 16½ cm.; true conjugate, 8 cm.

History of previous labors. Has had five children. First, difficult forceps delivery; child stillborn. Second, attempted forceps, but failed; craniotomy for face presentation. Third, pubiotomy (at the Retreat). Result good for both mother and child; left hospital in thirty days. Fourth, craniotomy; infant dead (prolapsed cord); at the Methodist Hospital. Fifth, pubiotomy at the Retreat. Result good for both mother and child; left hospital in twenty-five days.

Technique of operation. A longitudinal incision above and to the inner side of the left spine of the pubis is made through the sheath of the rectus, only large enough to admit the

tip of the index finger, which located the upper border of the pubic bone just inside the pubic spine. The periosteum is nicked, and the point of the Döderlein needle inserted. A metal catheter placed in the bladder is forcibly drawn to the opposite side by an assistant and the index and middle fingers of the operator's other hand are then passed into the vagina to further push the base of the bladder to one side and the head upward, and having located the tip of the Döderlein needle, guide its point as it is made to hug the posterior surface of the pubic bone, and escaping the margin of the obturator foramen, by a sharp turn of the handle the needle finally is swept under the pubic arch ready to emerge through the soft tissues of the labium. The left labium is then strongly dragged toward the median line, and the needle thus is ready to puncture the skin at a point well removed from injury to the labial veins and from contamination with lochial discharge. The Gigli wire saw is drawn into place as the needle is removed. Before beginning sawing, the fingers of the left hand are again placed in the vagina to secure a correct line along which to sever the bone. This line passes just within the pubic spine and avoids the margin of the obturator foramen.

Traction upon the handles of the saw hold the latter firmly in this line until a few strokes of the saw are carefully made to insure accurate section of the bone along this line. When the bone is completely severed, there is free oozing from the upper opening, probably from the cut bone, but none from the lower puncture. The bleeding is at once permanently controlled by a small gauze pack placed in the wound and between the separated ends of the bone. The ends are separated a finger's breadth as soon as the section of the bone is complete. The cervix being completely dilated and the vagina relaxed, axis-traction forceps will bring the head into the pelvis, care being exercised not to put sudden strain on the bladder and vaginal attachments by a too rapid delivery. During the traction, the ends of the severed bone separate about three fingers' breadth, two assistants meanwhile making counter-pressure upon the trochanters. The gauze pack is then removed from the upper incision; the two small skin incisions are closed, each with one silkworm gut stitch, the upper including the split fascia of the rectus. A change of rubber gloves is desirable for the forceps delivery.

A wide adhesive strip is applied around the pelvis, and the patient placed upon a modified Bradford canvas frame for her comfort and the convenience of her care during the puerperal period.

Dr. Norris reserves pubiotomy for multiparæ with conjugates above 7 cm., in whom there has been a test of labor, the history of which suggests probable contamination. When the latter is assured, he elects craniotomy.

CÆSAREAN SECTION

Cæsarean section was performed eight times, the indication in seven cases was a contracted pelvis, in the other case, a fibroid obstructing the birth canal.

The conjugata vera, in the pelvic deformatory cases, varied from 7¼ to 8¼ cm. The infants varied in weight, from 6 lbs. 7 oz., to 9 lbs. 14 oz. There was no maternal or infantile mortality. In one case in which infection was suspected prior to admission, a local pelvic abscess was drained through the cul-de-sac on the 23d day of the puerperium. In one case a tightly closed cervix caused an elevation of temperature, and required dilatation on the fifth day to secure drainage. In one case where a fibroid obstructed the birth canal, Cæsarean section and myomectomy were performed. This patient died of acute gastric dilatation.

The actual measurements of the conjugate vera diameter cannot determine the relative indication for elective Cæsarean section. It is a growing conviction with Dr. Norris, that a conjugate below 8 cm. in primiparæ or multiparæ, who have lost one or more babies, usually will require elective Cæsarean section if the best interests of mother and child are considered. The history of multiparæ and the careful study of the relative size of the fœtal head and pelvis are important factors in this problem.

One case was subjected to Cæsarean section who had three children born alive in eight

TABLE C. CÆSAREAN SECTION.

Case No.	Para.	Indications	Previous Labors.	Conj. Vera.	Weight of Child.	Mortality. Maternal.	Mortality. Infant.	Puerperal Convalescence. Remarks.
6468	1	Generally equally contracted pelvis.	.....	8 cm.	7 lb, 7 oz.	0	0	Absence of lochia; on the fifth day temperature elevated; cervix found tightly closed; dilated, and uterine douche of alcohol (zviii); salt solution (zviii); tincture of iodine (zii). Temperature normal thereafter.
6534	9	Flat pelvis.....	Three stillborn with forceps; one miscarriage 2 months; Three living children, one born at 8 months; weighed 5½ lbs., one full term, very small; one very difficult forceps delivery, child small.....	7¼cm.	6 lb, 11 oz.	0	0	
6619	1	Flat pelvis.....	.....	8¼ cm.	7 lb, 11 oz.	0	0	In labor 6 hours before admission. Membranes also ruptured before admission. Repeated examination by her attending physician. Developed fever and a localized pelvic abscess; drained through a cul-de-sac incision on the twenty-third day of the puerperium. Temperature dropped to normal on third day after puncture.
6708	1	Flat pelvis.....	.....	7½ cm.	7 lb, 2 oz.	0	0	
6716	2	Generally contracted pelvis.....	.....	7½ cm.	7 lb, 1 oz.	0	0	
6718	2	Flat rachitic pelvis.	One stillborn child; version.....	7¾ cm.	6 lb, 7 oz.	0	0	
6398	4	....	Three stillborn children; all difficult forceps deliveries.....	8¼ cm.	9 lb, 14 oz.	0	0	Cæsarean section and myomectomy; pelvis blocked by subperitoneal fibroma (size of large grape fruit) springing from posterior wall of cervix and impacted below sacral promontory. On the second day, sudden development of the clinical signs of acute dilatation of the stomach, and death the following day.*
6749	1	Fibroid obstructing birth canal.....	.....	11 cm.	7 lb, 5½ oz.	1	0	

*Autopsy, Case 6749.—The peritoneum showed no signs of inflammation; the stomach, pale gray in color, was enormously dilated and contained a small amount of dark brown fluid such as had been washed from the stomach with the stomach tube; there was no marked constriction of the duodenum by the root of the mesentery, and for a distance of about a foot, the dark brown fluid was found in the duodenum. The area of operation exhibited no abnormalities; no lymph; sutures firm; no leakage. Cultures by Dr. B. A. Thomas, of fluid removed from the peritoneal cavity after death, revealed presence of coli communis. This, he believed to be from extravasation of fluid from the intestinal tract to abdominal cavity after death, in view of the normal macroscopic appearance of the peritoneum at the time of the postmortem examination. This belief was further confirmed by the microscopic examination of the portions of the intestines removed at that time, in which there were no microscopic evidences of thrombosis or of peritonitis.

previous pregnancies, these three all being under size. Another case had previously had one stillborn child, and one by Cæsarean section. Her third labor, which was at the Retreat, was by a successful induction of premature labor.

TECHNIQUE OF CÆSAREAN SECTION

The incision is sufficiently large to eventrate the uterus; upper abdominal cavity protected by a large gauze pad; other large pads surround the abdominal incision; a reinforced circular opening (2½ inches in diameter) in an apron of rubber dam ten to twelve inches square, is stretched and drawn over the fundus, down around the lower uterine segment to further protect the peritoneal cavity. The uterus is incised longitudinally from fundus to lower uterine segment; four to six Pagenstecher's interrupted sutures, which do not include the endometrium or peritoneum, are placed in the incision. These sutures are tied after closing the muscle with a two-row (up and down) continuous catgut (Chromic No. 2–20-day) suture. Especial care is taken to encircle and firmly close the upper and lower angles of the uterine incision with this continuous buried suture. The suture begins above the upper angle, penetrates the peritoneum at this point only, and the end is left protruding to make the only knot of this suture when the returning catgut has closed the musculature. It unites the lower stratum of the incised uterine muscle, never penetrating the endometrium, and returning, unites the upper stratum of the uterine incision, never penetrating the peritoneum except where it emerges through the peritoneum from below upward, to be tied at a point directly opposite where the suture was begun. Con-

tinuous catgut, No. 2, sero-serous suture down and then up, secures firm peritoneal coaptation. The rubber dam apron and pads are removed; the uterus replaced: and the abdominal wound closed with layer catgut, reinforced with four to six interrupted silkworm gut sutures, embracing all the layers of the abdominal wall, except the peritoneum.

EXTRAUTERINE PREGNANCY PAST TERM

Mrs. K. Age 20. Admitted July 1, 1910. Last menstruated September 3d to 6th. Para 1. No miscarriage. Felt life January 26, 1910. Estimated time of delivery, June 10th to July 2d. Previous menstrual history, normal. The nausea and vomiting very marked until fourth month, when it ceased, with the exception of two weeks prior to her admission. She had no pain or discomfort in lower abdomen until January, when she was seized with a very sharp pain in the right side, so violent, that she was unable to walk or lie down. She was presumably four months' pregnant. The following month (February 9th), was taken to the Kensington Hospital for Women, and remained there until March 3d. Was treated with rest, and ice-bags to abdomen. All pain had subsided during her stay in Hospital, and she felt quite well, and remained so until two weeks before her admission to the Retreat, when she was seized with violent pains in abdomen, labor-like in character, which continued at various intervals. She thought she was in labor, and sent for her physician, who, upon a vaginal examination, thought she was not due for another month. Diarrhœa, nausea, and vomiting, were symptoms during the two weeks prior to her admission; also pain over the entire abdomen. The nausea and vomiting ceased three days before operation, possibly due to the rest and quiet of the Hospital, which she did not get in her home. On admission, her pulse was 130; respiration, 30; temperature, 100°; tongue dry and heavily coated; face pinched, and entire body emaciated, possibly not weighing over 90 lbs. Abdomen was atypical in shape and color; glazed and distended arteries and veins over entire surface; fœtal head could be felt at the umbilicus. Owing to her history of being at least three weeks overdue, and her physical condition, the induction of labor was attempted when the existing conditions were diagnosed. Fœtal heart sounds and movements quite easily elicited, but after an unavoidable delay of thirty hours, before operation could be performed, the fœtus had died. The abdomen was opened through a thin abdominal wall, and the fœtus was found free in abdominal cavity with the sac ruptured. Considerable free fluid and meconium were in the abdominal cavity; there were no adhesions of the sac to any structure, except the placental attachment at the cornual end of the uterus. The freedom from adhesions, would, I think, indicate a recent rupture, and the intense pain of two weeks prior to the operation, would help to confirm this belief. The right tube and ovary were normal, also the left ovary and outer two-thirds of the tube; the inner third of the left tube fuses with the sac and placenta. No bleeding occurred; the broad ligament formed a pedicle for the sac, placenta, and left tube and ovary, leaving a normal uterus and a healthy tube and ovary on the opposite side. The general macroscopic appearance of the peritoneal cavity was one of mild peritonitis. After removing the fœtus, sac, placenta, and the left tube and ovary, the abdominal cavity was cleansed and closed with gauze drainage through the cul-de-sac and through the lower angle of the incision. The latter tract was permitted to close, and the cul-de-sac was kept open with a self-retaining rubber tube for four weeks. The convalescence of the patient was satisfactory, and when last seen, her health had been wholly restored.[1]

The report of Dr. George Outerbridge, who has very kindly examined the specimen, is as follows:

1. Section through thick portion of membranes. On the fœtal side the section is limited by a fairly thick fibrous membrane, fairly rich in cells — the "membrana chorii"; the epithelial lining of the amnion is completely lacking. Beneath the fibrous membrana chorii is a distinct layer of trophoblast cells with deeply-staining nuclei, scattered among which are remains of almost completely regenerated chorionic villi. Beneath this layer, and in many places directly continuous with it, is the tissue which

[1] She has recently visited the hospital and is again pregnant.

makes up the remainder of the section, namely, very loose connective tissue, containing much fat, engorged blood-vessels, and here and there marked round-cell infiltration. This tissue represents I should think, without doubt, remains of omentum, to which the chorion has in this region become attached, and from which it has derived a portion of its blood supply. The most interesting feature of this section is that throughout the omental tissue, in many places lying in the midst of areas of fat, are larger and smaller very distinct groups of large, round cells, having one or two nuclei; in other words we have here a most marked decidual reaction in the omentum. The maternal, i. e., the omental, edge of the section does not show any particular lining cells or membrane; doubtless a separation from the remainder of the omental tissue had taken place here before the operation, possibly due to inflammatory processes.

2. Section through large placental mass with blood-vessels. The section is composed of mature placental tissue, the villi being well preserved, and showing a single-layered epithelium. There is an enormous amount of blood in the intervillous spaces. On the surface are a number of large blood-vessels, surrounded by loose connective tissue resembling the jelly of Wharton, and a little deeper in the placental mass are groups of smaller vessels embedded in similar substance, but no structure representing the umbilical cord as such seen, the vessels having evidently already undergone subdivision at the point at which this section was taken. No amniotic epithelium.

3. Section through a distinctly whitish nodule in the large placental mass. A small portion of the section consists of placental tissue as described under 2, but the greater portion consists of completely degenerated villi, in which practically no nuclei can be made out, lying packed very closely together, with no blood in the intervillous spaces — in other words a so-called "anæmic infarct" of the placenta, due to circulatory disturbances. Throughout the degenerated area are numerous small areas of calcification.

4. Section through large placental mass near base of tube. Consists almost entirely of degenerated placental tissue, as described under 3, with somewhat more extensive calcification. On one surface is a broad layer of connective tissue containing well developed bundles of smooth muscle fibers, probably representing broad ligament.

5. Cross section of the tube, near distal end. The mucous folds are well developed, slightly thickened and edematous, and contain slightly engorged blood-vessels, but there is no inflammatory infiltration. The surface epithelium is everywhere well preserved; the folds are nowhere adherent to each other. In the outer layers of the wall on the other hand, and especially in the mesosalpinx, there is a most intense cellular infiltration, consisting almost entirely of polymorphonuclear leucocytes, with much hæmorrhage and granular debris. The condition is evidently one of a marked perisalpingitis, the tube itself being but little affected.

6. Cross section of the tube, near proximal end. With the exception of the fact that the inflammatory infiltration here is not quite so severe as in 5, the picture is practically the same.

7. Cross section of ovary. The germinal epithelium is well preserved in places; in others it is lacking. Large numbers of primordial follicles in the cortex; also areas of hæmorrhage. The stroma is for the most part normal, but scattered throughout the cortical portion of the ovary are groups of large, round, typical decidua cells lying in the stroma. Although these occur only in the cortex the fact that they in places extend fairly deeply into the organ, and are in many places covered by perfectly normal germinal epithelium, indicates that they have arisen, not from the latter, but from the stroma cells of the ovary; in other words, we have here a marked decidual reaction of the ovarian stroma. The blood-vessels in the interior of the organ are for the most part normal; here and there somewhat congested. In addition to the structures already noted a couple of cystic follicles are to be seen, a large corpus fibrosum, and a large, well developed corpus luteum, the latter showing very extensive calcification.

A study of the specimen and the clinical history, suggests that this was a case of secondary abdominal pregnancy, the primary rupture of the tube having probably occurred about the fourth month, when the patient was sent to the Kensington Hospital.

PLASTIC SURGERY

Excluding slight external lacerations there were thirty-nine primary repairs of the pelvic floor and perineum—thirty-five in primiparæ, four in multiparæ. In these cases there are two complete sphincter tears, both in primiparæ; one, a natural delivery of a L. O. A., 9 lbs. 15 oz. baby, the other, a very difficult forceps of an occiput in the hollow of the sacrum in a justominor pelvis, baby weighing 7 lbs. 7 oz. The repair of the first case was satisfactory, but the latter had a second operation two weeks later.

Seven secondary repairs for old laceration and relaxation of the perineum were performed; one was a complete sphincter tear upon which two operations had been unsuccessfully performed. In this case the result was most satisfactory. Catgut was used throughout. The bowels were locked for nine days. Diet: Albumin water and pepto-

noids. This restricted diet caused the loss of the mother's milk in one of the three cases; lactation was not interrupted in the other two.

MINOR SURGERY

A large abscess in Bartholin's gland was excised two weeks before term. The patient's delivery and convalescence were normal.

The posterior cul-de-sac was incised and drained in one case of Cæsarean section.

The placenta was removed manually in one case.

Intrauterine douches (1 per cent lysol) were given to six patients. In no case was it necessary to repeat the douche, which is followed by a solution of alcohol (℥viii); salt solution (℥ viii); tincture of iodine (ii ʒ); and a loose pack of formaline gauze, the gauze being removed at the end of twenty-four hours.

In six cases the uterus was explored with placenta forceps, and in five cases, with a large sharp curette. These cases were also treated by irrigation, and pack as above.

Uterine tamponade was employed in two cases of postpartum hæmorrhage, and one vaginal pack for placenta prævia.

DEPARTMENT OF TECHNIQUE

SUPRAPUBIC PROSTATECTOMY, WITH A METHOD FOR THE CONTROL OF POSTOPERATIVE HEMORRHAGE[1]

By LEONARD FREEMAN, M. D., Denver, Colorado

ALTHOUGH it is generally conceded that prostatectomy is the best treatment in most cases of hypertrophy of the prostate, it is not settled as to whether this should be done by the perineal or by the suprapubic route, each method having many strong adherents. Most foreign operators approach the gland from above, while in this country preference has always been given to the low operation, although in recent years the high method has rapidly been gaining ground among surgeons of judgment and experience.

The principal arguments usually advanced in favor of the perineal approach are: (1) accessibility of the prostate, (2) ability to operate by sight as well as by touch, (3) better drainage, (4) less mortality, (5) possibility of preservation of the sexual function, (6) easier control of hæmorrhage.

These arguments all sound well, but upon closer consideration they are not so forcible as they at first appear. Experience with both methods soon teaches one that the lateral lobes are about equally accessible from above and from below, with the balance always in favor of the former procedure where the middle lobe is found projecting into the bladder, as is so often the case. Exceptions undoubtedly exist, especially in patients with unusually deep pelves or with an exceptional amount of abdominal fat, or when the gland lies very low in relation to the perineum, but such conditions are not frequent.

Much stress is often laid upon the desirability of operating under the control of the eye; but this is a mere assertion, which, although it makes a certain appeal to one's fancy, really has no foundation in fact. Many operators, in dealing with large numbers of cases, have demonstrated that the prostate can just as easily and safely be removed by touch alone; besides, in the vast majority of perineal operations the actual enucleation of the gland is no more under control of the eye than it is in the suprapubic procedure, except in Young's method, which, owing to various limitations and objections, has not received very extensive recognition.

The claim of superiority for the "down hill" drainage of perineal operations is also deceptive; because drainage in these cases is not accomplished by gravity alone, but is very largely influenced by the contractility of the bladder and by intra-abdominal pressure — in other words, the cavity to be drained is not one with rigid walls like an empyema, but one which is collapsible, like an appendical abscess. To be sure, a small amount of urine and pus is always retained; but this is also true when perineal drainage is used, because it is not practicable to so accurately adjust a tube that it will carry off *all* fluid and not leave a small puddle around its projecting end. In addition, the more recent statistics show that sepsis is little if any more frequent in the high than in the low operation. If one wishes, however, low drainage can always be introduced through a stab wound in the perineum, during the course of a high operation.

In estimating the question of mortality, the older statistics are misleading and should be left out of consideration. The first operations were nearly all suprapubic, and the death rate was high, on account of crude technique and because surgery was not employed except as a last resort in desperate cases. More recent experience shows that the mortality of the high operation is no greater than that of the low one, as shown by the statistics of the Mayos, Mr. Freyer of London, and others.

Owing to the age of the patients, the preservation of the sexual function is a matter of but slight importance in most prostatic cases. It is less apt to be interfered with, however, in the suprapubic operation than in the usual perineal procedure; but when it is especially desirable to preserve the integrity of the seminal ducts, the operation of

[1] Read before the Colorado State Medical Society, August 17, 1911.

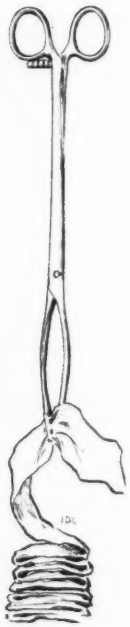

Fig. 1.

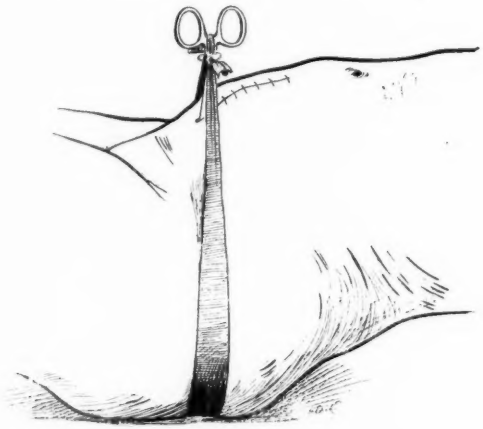

Fig. 2.

Young can be employed, although it is more difficult, and the chances of permanently relieving the prostatic obstructions are probably not so great.

In most suprapubic prostatectomies the hæmorrhage is small in amount and soon ceases spontaneously. Rarely a case is encountered in which the bleeding is prolonged, excessive, and sometimes fatal. It is the fear of such an unfortunate occurrence which has perhaps done more than anything else to deter many operators from adopting this method, in spite of its obvious advantages. Further on, the writer desires to present a simple method for the effective control of such hæmorrhage, which he has employed several times, and which he took occasion to mention in a discussion before the American Surgical Association, in Philadelphia, in 1908.

From what has been said, it would seem that the perineal operation has no especial advantages over the suprapubic. On the other hand it has several very positive disadvantages, which, other things being equal, should weigh heavily against its general employment, especially by those of limited experience.

1. *Postoperative incontinence of urine*, from injury to the "cut off muscle" or to its nerve supply. This is an extremely disagreeable complication, much dreaded by both patients and surgeons. It occurs often enough to make it a very important if not a deciding factor in the choice of the method of operation. In fact, it was the cause of my own desertion of the perineal for the suprapubic route. My first series of operations was done through the perineum, but the embarrassing consequences of two or three cases of incontinence caused me to change my method, a step which I have not had occasion to regret. Since then I have operated 37 times by the suprapubic route without a single case of even partial or temporary incontinence.

2. *Injury to the rectum*, resulting in the formation of a rectoperineal or rectovesical fistula. This also is not so uncommon an occurrence as might be supposed, and its correction is not easy.

The advantages of the suprapubic method are positive and striking: (1) There is no danger of postoperative incontinence of urine — a most important point. (2) There is no danger of injury to the rectum. (3) The operation is more easily and quickly done. (4) There is less likelihood of subsequent epididymitis (Judd).

As intimated above, the weak point in the suprapubic operation has been the control of hæmorrhage. This would never be difficult to accomplish with gauze packing provided counterpressure could be obtained. It is always easy enough to fill the prostatic cavity with gauze, but it has a tendency to at once loosen and drop back into the bladder. To be sure the entire bladder can be tightly packed, but this is uncomfortable, inefficient, and otherwise objectionable.

The simplest and most reliable way is to pack

the bleeding cavity with a long strip of iodoform gauze, or gauze soaked in some styptic material. The end last inserted is retained in the grasp of a pair of large clamp forceps, preferably with a square, blunt end. (Fig. 1.) The handles of these forceps project through the hole in the bladder, and for some distance beyond the abdominal wound. (Fig. 2.) It is evident that properly graduated pressure upon the gauze packing by means of these forceps will control the hæmorrhage. This pressure is readily obtained by passing an ordinary rubber bandage around the patient's body beneath the pelvis and over the notch between the locked handles of the instrument. (Fig. 2.) Gauze pads are now adjusted about the handles in such a way as to incline them at any desired angle, thus regulating the direction of the pressure, which should not be greater than necessary, and the whole is held in place by adhesive strips and an ordinary bandage.

It is obvious that this method of controlling hæmorrhage may sometimes be useful under other circumstances, for instance, in hepatic and pancreatic surgery.

CÆSAREAN SECTION

A Discussion of the Technique with Report of Eleven Cases

By E. M. PRINCE, M. D., Birmingham, Alabama

HAVING recently seen one case in which the life of the child was sacrificed and that of the mother nearly so, and knowing of another in which both mother and child paid the penalty for the lack of proper advice from the medical man, is sufficient apology for the presentation of this paper.

In one case, as the medical attendant seemed to be much impressed with the small size of the pelvis, the family suggested that he secure consultation and if the delivery was to be attended by great danger to the mother or child, the child could be removed through the abdomen. The physician replied, however, that the risk of Cæsarean section was so great that it was best to permit the woman to trust in the Lord and a good pair of obstetrical forceps, which she did. The trust was evidently misplaced as to the forceps, the woman dying from shock, never having been delivered, although the physician, faithful to the end, never ceased pulling.

Both these patients could have been saved had proper care or forethought been used, as the risk attending Cæsarean section under proper surroundings is very little more than that of a normal labor.

Every primipara should be entitled to a careful measurement of the pelvis to see that it is possible for her to give birth normally at full term. If this is found not to be the case, then the obstetrician has two courses open to him; one is to terminate the pregnancy, the other is to permit the pregnancy to advance to about full term and then do a Cæsarean section. Either I think justifiable and the mother's wish should receive first consideration. The safety of an operation of this character should be made plain. Few women will reject the operation when they find this is their only hope of becoming mothers, for a woman who can not have babies wants them though often if she can have them she does not want them. On two occasions I have seen women who had almost lost their lives after a craniotomy express themselves as desiring to become pregnant again and to have a Cæsarean section performed; in one case the wish was gratified, the woman being delivered of a fine boy baby about fourteen months later.

After noting the pelvic measurements, the woman's general condition should be gone into in order to ascertain that her heart and lungs are in condition to go through a pregnancy and at the end an abdominal operation. Should either these or the kidneys be found in any seriously crippled condition, then termination of pregnancy would certainly be preferable to permitting her to go on the operating table. The urine should be examined carefully every one or two weeks as would be done in a normal case.

The best time to operate is a debatable question; some of our best obstetricians and gynecologists prefer to wait until labor begins; others prefer to select eight and one-half months as the best time. The former assert that the woman is better prepared to undergo the operation, as the blood pressure at term is somewhat elevated

and the removal of the child will be more like normal delivery, that the uterus contracts more readily, and the cervix is dilated and remains so, thereby permitting free drainage, that the milk is seen in the breast earlier, and that the baby is stronger and is more likely to remain so as the breast furnishes food earlier. The others declare that the operation is not of sufficient shock to require elevation of blood pressure, that the uterus will contract at any time from applied stimulation, that the cervix can be artificially dilated by passing forceps from above downward after removal of the child and that the milk is secreted early enough for the babe. The strongest argument offered by the latter is that if we select the time for performing the operation we can prepare the woman by a thorough cleansing of the intestinal tract, by proper dieting and can without "fuss and furor" have everything ready for the proper performance of the operation. The woman's postoperative convalescence is certainly more comfortable when the operation is undertaken before labor begins.

The anæsthetic should be given by one who is thoroughly qualified to do this work. The day for selecting a man to give the anæsthetic because he is the possessor of the least quantity of gray matter has passed, and the people are beginning to demand that they be protected in this respect as in others. The anæsthetic of choice should always be gas-oxygen, because it is the least dangerous and it is free from the postoperative vomiting and nausea of ether or chloroform. The woman does not go through the stage of fright, nor does she exhaust herself struggling in the preanæsthetic stage. She sleeps soundly during the entire operation and is wide awake conversing with her family in from ten seconds to two minutes after the operation is completed. There is no danger of ether pneumonia, no danger from after effect of the anæsthetic on the kidneys. It does not reduce the hæmoglobin, nor is there danger of the liver toxæmia so often seen after general anæsthetics. During the past year we have endeavored to give gas-oxygen more frequently than formerly and have succeeded in reducing our ether anæsthesias to a much smaller number, and never use chloroform. During each month gas-oxygen anæsthesia is used from 50 to 100 times, which includes its administration in almost every kind of abdominal operation and in all sizes and classes of men and women, and there are no contraindications to its use, regardless of size, character of operation, nor time required to complete it. Gas-oxygen can not be given by the interne or one who has not been carefully trained in the work, as it requires an observant eye and the proper mixture of the gases in order to obtain the best results.

PREPARATION OF THE PATIENT

Two nights before operation the patient should have the bowels freely emptied by a dose of castor oil, one ounce or more. This is given two nights before in order that she may have a quiet night preceding operation. If the bowels have not been thoroughly emptied by the oil she may have a saline laxative the next morning. The day preceding the operation she should take no food but nutritious liquids, and should drink water freely. The urine should be examined and the quantity estimated for twenty-four hours. The white blood count should be made in order to note the normal in case of future complications, in which an increase of white blood cells would be of diagnostic value. The only preparation of the abdomen is to shave, using no soap, and after the patient is on the table to cleanse the skin with ether and follow with tincture of iodin. The objection to using soap is its tendency to stop up the pores of the skin, thereby preventing the entrance of the ether and iodin into the deeper tissues. The ether is used to dissolve the fats from the skin and permit the iodin more freely to permeate it. I have used this method of preparation in over fifteen hundred cases and have no cause to regret its use. There is no slopping on the table as is so often seen after the use of the soap and water, and the chilling to the body surface is not so great. It seldom causes any irritation to the skin and when it does the irritation is superficial, and I have never known a patient complain from its use. In applying it care should be used to prevent its running under the patient and thereby getting excluded from the air, as a blister under these circumstances is quite likely.

OPERATION

The operation should be performed as expediently as is consistent with good work, and the child should be delivered as quickly as possible in order to prevent its death, from interfering with the placental circulation. The longitudinal incision in the uterus is the better, as this affords more room for the delivery of the child without tearing the muscular wall of the organ. The transverse incision in the uterus is recommended on account of its relation of the blood supply of this organ, but often this incision has to be supplemented by a longitudinal one in order to give room for delivery, or the uterine wall is so badly torn that it is necessary to remove the organ.

The decision relative to removal of uterus at this time should rest with the mother. If she does not desire to undergo another Cæsarean section I think the better way is to remove the uterus, leaving the ovaries. This can be done as quickly as repairing the long wound in the uterine wall and we thus eliminate the danger of future bleeding, and also the danger of blood clots collecting in the uterine cavity and causing an infection. The uterus plays no part in metabolism or the sexual life of woman and does not deserve the consideration we should so conscientiously give to the ovaries when a question of their removal is brought before us. In case of suspected sepsis when the woman has been in labor for many hours and the membranes have ruptured, the uterus should always be removed.

No constrictor should ever be placed around the cervix as is so often recommended in text-books. There is no necessity for doing this to control hæmorrhage; the constrictor bruises the tissues and if placed on early enough will cause marked asphyxiation of the child.

The abdomen should be closed by layers, but this is often difficult, as the muscle is so thinned out from pressure from within that it is often hard to find any fascia to bring together.

POSTOPERATIVE TREATMENT

This is similar to the usual treatment in any postoperative case. The urine should be measured; enema given at the end of forty-eight hours, liquid diet begun as soon as the bowel action is secured; breasts carefully looked after by a competent nurse; and complications treated as they arise.

CONCLUSIONS

A few conclusions may be drawn from the reported cases, although these are limited in number:

The patients operated on at eight and a half and nine months had about the same kind of convalescence; the babies all living, and the eight and a half months' baby is doing as well as the nine months' children. In the nine months deliveries the breasts certainly seemed to secrete milk earlier. The generally contracted pelvis seemed to predominate. Accurate pelvic measurements were taken, but as these were not placed on the chart in some cases, they are omitted. Two of the patients showed heart lesions and one an acute bronchitis, and this emphasizes the importance of a careful examination of chest before operation. There was an increase of leucocytes in each case, being marked in the patient with intramural abscess. The hæmoglobin was well up in all but one case. Red blood count was about normal, and blood pressure was rather higher than normal.

The anæsthetics used were ether, ether and oxygen, and gas-oxygen. The time of patient recovering consciousness after gas-oxygen as compared to ether is noteworthy. The amount of urine excreted for the first twenty-four hours following gas-oxygen anæsthesia as compared to ether will show an increase in favor of the former. Hysterectomy was done in most of these cases, being done either by request of the patient or as a matter of necessity. The ovaries were always left in situ.

The time of delivery of the child is important, as delay after the circulation in the uterus is interfered with may cause death or dangerous asphyxiation.

The time of operation is not of great importance as the woman is generally in good condition to stand an operation even if prolonged, although the operation should be performed as speedily as is consistent with good work.

The pulse rate given in the table represents the rate before going on the table and rate at completion of operation, which usually speedily came down to near normal; and the postoperative pulse given represents the maximum rate, although in several cases this lasted only a few hours.

The temperature represents the postoperative rise seen after any abdominal operation, although it seemed to go higher than in the usual laparotomy. This can be accounted for perhaps, by the abdominal cavity being filled with the liquor amnion after incision into uterus, which, try as one may to prevent it, will flow back into the abdomen. The fluid unless contaminated from without is not infectious.

Considered individually there were only six of the cases which deserve to be mentioned:

First was case 4 in which the patient had been carefully watched after the third month of pregnancy, knowing she was running a septic temperature with chills and at times a very high leucocyte count. At time of operation, which was about the eighth month, she was running a high temperature and had a leucocyte count of 29,000. A quantity of pus was liberated, the uterus was removed and the patient made a prompt recovery and has since gained in flesh and shows no ill results of the long period of pus absorption. Whether a physician is justifiable in permitting a woman to run this risk for the sake of the unborn child I am not prepared to say.

In case 5 the patient had a previous Cæsarean

CAESAREAN SECTIONS

	PRE-OPERATIVE FINDINGS											POST-OPERATIVE				
NAME	AGE	DATE	MO.	PELVIS	CHEST	BLOOD	URINE	ANAESTHETIC	OPR.	TIME OF DEL OF CHILD	TIME OF OPR.	PULSE	AWAKE IN	VOM.	MAX TEMP	MAX PULSE	URINE EXC IN FIRST 24 HRS
1 J. B.	30	10/8/09	8½	UNIV CONTRAC	NEG	W B C 10,800 R B C 4,500,000 HEMO 95% B P 140	NEG.	ETHER ½ ½	NO HYST NO TUBES REMOVED	1 MIN.	40 MIN	BEFORE 96 AFTER 100	SEV HRS	ONE DAY	102	110	16 OZ
2 S. L.	34	6/11/10	9	TRANSV MEAS LESS THAN 3 IN	NEG.	W B C 9,000 R B C 4,500,000 HEMO 80% B P 125	TRACE ALB	ETHER ½ ½	HYST.	2 MIN.	36 MIN	BEFORE 108 AFTER 108	ONE HOUR	SOME NAUSEA VOM FEW HRS	100	124	24 OZ
3 C. J.	38	8/29/10	9	FLAT CONTRAC ANT. POST	NEG	W B C 9,000 R B C 4,500,000	NEG.	GAS 200 OXG 40	HYST	1 MIN	28½ MIN	BEFORE 128 AFTER 150	½ MIN	NONE	103⅜	120	31 OZ
4 S. B. H.	19	9/17/10	8	NORMAL	AORTIC REG.	W B C 29,000 R B C 3,800,000 HEMO 80% B P 160	TRACE ALB	GAS 175 OXG 45	HYST.	1 MIN	33 MIN	BEFORE 112 AFTER 112	½ MIN	NONE	100⅜	136	38 OZ
5 M. M.	20	10/21/10	8½	GEN CONTRAC	AORTIC STENOS	W B C 12,000 R B C 4,500,000 HEMO 80% B P 138	NEG.	ETHER ½ ½	HYST	1 MIN	28½ MIN	BEFORE 84 AFTER 104	3 OR 4 HOURS	12 HRS	102	108	21 OZ
6 E. J.	29	12/25/10	9	GEN CONTRAC	RALES MUCUS	W B C 10,000 R B C 5,000,000 HEMO 80%	TRANS ALB	GAS 175 OXG 40	HYST	1 MIN	33½ MIN	BEFORE 120 AFTER 136	15 SECONDS	NONE	102	120	42 OZ
7 B. P.	32	9/27/10	9	TRANSV 2½ IN.	NEG.	W B C 10,000 R B C 5,000,000 HEMO 80%	NEG.	GAS 300 OXG 60	HYST	1½ MIN	56½ MIN	BEFORE 120 AFTER 150	½ MIN	NONE	100⅘	120	37 OZ
8 H.	24	3/1/11	8	NORMAL ECLAMPSIA	NEG	W B C 12,000 R B C 4,000,000 B P 180 HEMO 80%	CASTS ALB	GAS 110 OXG 135	NO HYST	½ MIN	21½ MIN	BEFORE 170 AFTER 108	1 MIN	NONE	105	148	7 OZ
9 W.	35	8/2/11	9	GEN CONTRAC	NEG	W B C 18,000 R B C 4,500,000 B P 130	NEG	GAS 175 OXG 40	HYST.	1½ MIN.	38 MIN	BEFORE 72 AFTER 108	½ MIN.	NONE	104	128	28 OZ
10 L. G.	23	5/27/11	7½	NORMAL	ACRTIC STENOS	W B C 7,800 R B C 4,100,000 HEMO 70%	QUANTITY ALB & GRANULAR CASTS	GAS 125 OXG 30	HYST	40 SEC.	38½ MIN	BEFORE 88 AFTER 116	½ MIN.	NONE	101⅜	116	38 OZ
11 D.	27	6/17/11	8½	NORMAL ECLAMPSIA	NEG.	W B C 17,000 R B C 4,500,000 HEMO 80 B P 190	ALB HYAL & GRAN CASTS	GAS 125 OXG 20	HYST	1 MIN.	26 MIN	BEFORE 80 AFTER 150	1 MIN.	NONE	104	122	34 OZ

section. She requested the removal of the uterus at this time.

In case 6 the patient had had a craniotomy performed some years previous and became pregnant fully realizing that an operation was her only hope for a living child.

In case 8 the woman was having light convulsions when brought in. The urine showed a quantity of albumen and many granular casts. She was quite fleshy and at best the labor would have been a long one, so we decided that a Cæsarean section was indicated. She continued to have very severe convulsions after delivery and died thirty-six hours later, in spite of many measures adopted to control the condition. In this case as in all others that we lose, we often think the other way would have been better.

Case 10 was of interest as there was a hernia of the uterus, it falling completely over the pelvic bone when the woman stood erect. She had only the skin covering the uterus anteriorly and no support to hold it in the abdominal cavity. She had gone through one labor in this condition and on account of the lack of support of the abdominal muscles had a very protracted labor. Her urine was also loaded with albumen which did not yield to treatment. Under observation in the hospital for one week the quantity of albumen found in the urine increased. The medical man had advised a Cæsarean section in this case and taking into consideration the several indications it was done. Albumen rapidly disappeared from the urine and the woman made a rapid recovery.

Case 11 was one of considerable interest to me as it was very similar to case 8, except the eclamptic convulsions were very much more violent and prolonged. She had quite a quantity of albumen, hyaline, and granular casts. She was a large fleshy woman and was very badly swollen including the limbs, vulva, abdominal wall, face, and hands. The question of a high forceps or Cæsarean section was the point to decide and the latter was chosen on account of the tissues in the vagina being so badly swollen as to almost occlude the passage, and believing the Cæsarean would produce less shock, as it could be done more quickly, and as she would be under the anæsthetic a much shorter time. When the abdominal wall was incised about one-half pint of clear fluid ran out over the abdomen and the abdominal cavity was also full of fluid. The uterus was removed in this case because the absorption of the large amount of tissue incident to the uterus undergoing involution we were afraid would throw on the kidneys more work than they could stand.

After delivery there were no convulsions for twelve hours after which they again began with great violence. We gave at once fifteen minims of veratrum hypodermatically, bled the patient two pints, gave chloral by rectum, and scopolo-

mine by hypo. After having five very severe spasms they subsided, the patient went into deep sleep from which she could not be aroused for six hours. Her temperature rose to 106 and her condition did not look encouraging. We continued the chloral in twenty grains doses by enema and at the end of twenty-four hours gave five minims of croton oil on back of tongue. Her bowels moved in six hours after taking the croton oil and improvement began at once. The temperture subsided, albumen grew less and urine increased in quantity, which was perhaps due to the hypodermic administration of spartine in two gr. doses every four hours. The mother and baby are both in excellent condition at this time.

There were seven boy and four girl babies, and at the present time they are all alive, with one exception, and are doing nicely.

THE TREATMENT OF HARELIP

By TRUMAN W. BROPHY, M. D., D. D. S., LL.D., Chicago, Illinois

THE treatment of harelip, single or double, is an operation which calls for most careful manipulation, and the adjustment of the parts in such a way as to leave them as free as possible from evidences of the deformity.

It is not my purpose to here discuss all the details pertaining to the surgical treatment of harelip. It is sufficient to state that the first consideration is the nose.

The nostrils, in such cases, are always expanded and the nose given a flattened appearance. When the harelip is single the nose is diverted to the opposite side; when double, and complete the nose is more frequently in the median line of the face, but the nostrils are expanded and abnormally large.

The first step is to bring the tissues in contact so as to produce nostrils of normal size, thus removing the flattened appearance of the nose. Having done this, the work of forming the lip may be proceeded with.

The object of this short article is especially to call the attention of surgeons to the excellent device which I have designed for holding the parts in contact and relieving tension on the sutures.

Formerly, harelip pins were employed; then wire sutures with buttons on the sides; strong silk sutures were also used, but with them all, sometimes the lip would part and the operation result in failure.

Hainsby's compress was successful many years ago to force the cheeks towards the median line,

Fig. 1. Double harelip. Complete cleft of hard and soft palate. Protruding premaxillary bones.

Fig. 2. Second operation. Hooks adjusted; adhesive strips; rolls underneath hooks.

Fig. 3. Front view of patient three weeks after operation on the lip.

thus relieving the tension on the lip. Adhesive straps have been used, with more or less success, but even these did not always accomplish the work satisfactorily.

This simple device here illustrated, will relieve all tension on the sutures, draw the cheeks toward the median line, and hold them firmly in position until union of the tissues may take place.

In figure 2, for purposes of illustration the adhesive strips have been stained black in order that they might be more easily seen in the photograph.

The adhesive strips are cut so as to be broad in front of the ears and then narrowed down as they approach the center of the lip. They are lapped over and doubled at the lip end, and the smallest size of dressmaker's hooks are sewed through the adhesive strip.

One strip is placed on each side and then silk sutures are carried from the hooks on one side to the corresponding hooks on the other side, across over the lip. The tissues on each side of the lip are carried towards the median line, the lip is thereby pouted outward; all tension is removed from the tissues, and then the lacing from one hook to another, by means of silk sutures, holds the parts steadily and quietly in position.

Should the silk which is carried from one side to the other, make an impression upon the tissues in the median line, this can be relieved by passing a small roll of gauze beneath the lip end of the adhesive strip and beneath the hooks, thus lifting the sutures so high that they cannot make pressure upon the skin.

This method of retaining the edges of the lip in contact until union may take place, may be relied upon as most efficient. The coaptation sutures, in fact, the only sutures I employ for this purpose, are horsehair, and as is well known, horsehair sutures will not leave permanent suture scars.

By the adjustment of this device, the lip may be kept absolutely clean, and the surface at the line of union is always visible.

ESOPHAGOSCOPY AND BRONCHOSCOPY[1]

Reports of Cases of Foreign Bodies in the Esophagus and Bronchi Operated by the Killian Method

By THOMAS HUBBARD, M. D., Toledo, Ohio

CASE 1. Boy, aged 4. One-cent piece in esophagus one month. Complicated by stricture near cardiac orifice caused by swallowing lye when three years of age. (Referred by Dr. A. Krieger.)

This child was known to have a stricture of the gullet and yet was allowed to eat any kind of food and things. At intervals during the past month there had been complete obstruction, due no doubt to the one-cent piece, which was known to have been swallowed, but even during that period a rather large glass bead had passed through. The child was brought to me on account of threatened starvation and Mr. Dachtler, Roentgenologist, readily located the one-cent piece near the cardia. Under ether anæsthesia the Killian tube was passed and with the Brünings-Kirstein headlight the esophagus was explored. At the depth of the tracheal bifurcation there was an infiltrated area of mucosa covered with granulations. Below this the tube entered a sacculated area filled with debris consisting of vegetable fiber, including peapods and saurkraut and fragments of gristle and meat. I could not find the coin. I attempted to empty this sac by using forceps through the tube but it was tedious and I withdrew the tube and used an old fashioned bristle probang. This was very effectual and I recommend it for this purpose. The sac was soon cleaned, but even then I could not find the coin. It was afterwards located in the lower bowel by the X-ray. had crowded it through the stricture during the excavating process.

A stricture of this kind should be treated and I have no doubt but that by careful dieting for a few years with occasional dilation of the cardiac orifice and local applications to the mucosa through the esophagoscope he could be cured.

Eight coin and button cases have been successfully operated in part with the Killian instruments. The large Ingall's esophageal tube — non-beveled — should be selected for this kind of exploration as with it one is less liable to slip past a thin flat foreign body lodged in the recess below the cricoid. Coins, and especially small ones, are not always easy to find, as they frequently shift when the patient is in anæsthesia, and may be anywhere from cricoid to cardia and flat against the wall in a bend or recess of the esophagus.

I will report only two of the cases of *bone fragments in the esophagus* that have come under my observation. In experience prior to and since the development of the art of esophagoscopy I learned to consider these cases as of rather grave

[1] Read at the Philadelphia meeting of the American Laryngological Association, May 30, 1911

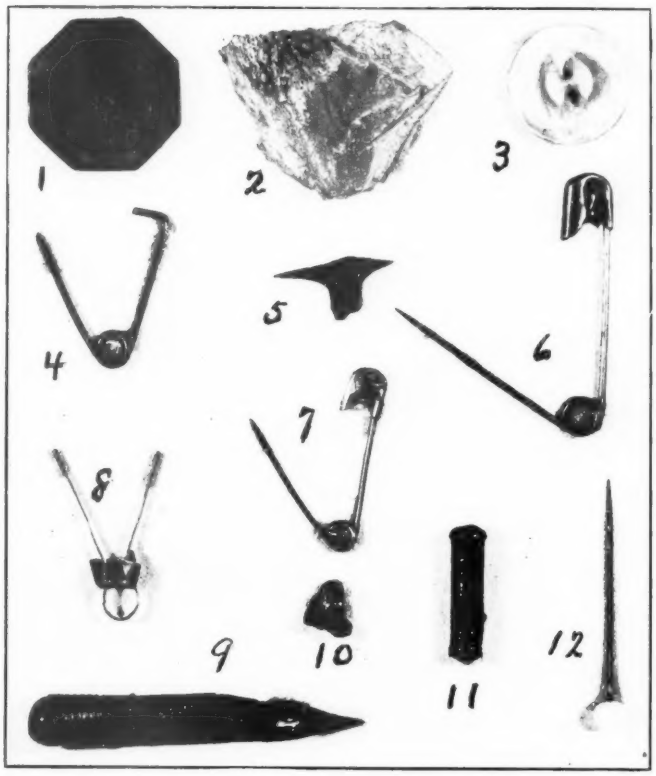

Plate A. Showing various foreign bodies removed from esophagus and bronchi.

character. Very rapid ulceration and perforation of the esophagus follow impaction of pieces of bone and crude surgical attempts at dislodgment. One never knows the dimensions nor the exact shape of the fragment, and usually the impaction is caused by sharp spicules on opposite sides. An experienced Roentgenologist can usually locate a large mass but of course no detail as to exact shape can be expected especially in adults. I would also add that owing to the familiarity with this kind of foreign body the victim is usually careless in seeking surgical advice. Often they do so only when compelled to by pain and cervical swelling indicative that the tissues are infiltrated and softened to the degree that makes examination difficult and extraction fraught with danger. Edema of the larynx is the most common and serious complication. The operator must depend almost entirely on the esophagoscope and study the bone *in situ* and try to grasp it so that a partial turning will release it with the least amount of laceration of the mucosa. For this purpose a hook may be more useful than forceps.

Case 2. Woman aged 45 years. Bone in esophagus 5 days. Referred by Dr. O. W. Kimball. (No. 5 in Plate A.)

During the past two days she could swallow only a small amount of liquid. The cervical tissues were edematous and temperature was 102°. The neck was rigid and there were evidences of periesophageal infection. She was quite hysterical from exhaustion and fear but under local anæsthesia I succeeded in locating the fragment just below the cricoid isthmus. It was shaped like an anvil, both ends being sharp spicules. I grasped it fortunately and dislodged it, but there was considerable laceration. She was dieted on sterilized milk and given bismuth powders frequently and gradually the cellulitis subsided.

Case 3. Man, aged 76. Large fragment of bone in the esophagus 5 days. Dimensions: $1\frac{3}{8}$ inches by 1 inch, and $\frac{3}{8}$ inch thick. Referred by Dr. Reed, Ottawa. (No. 2 in Plate A.)

Two attempts had been made to extract or push this piece of bone into the stomach. Fortunately it was too

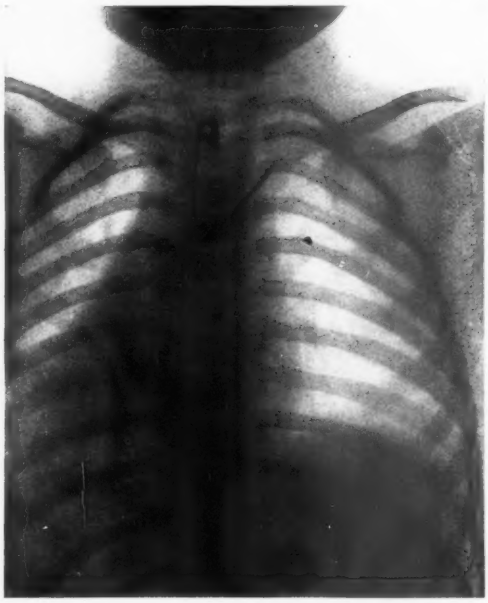

Fig. 1. Large open safety pin in the esophagus. (Case 4.)

large to be pushed very far. Mr. Dachtler located it by transverse method, impacted just below the cricoid. The cervical tissues were edematous and no food, not even liquids, had passed for 24 hours.

Under local anæsthesia the foreign body was readily seen about 7½ inches from the incisors but it taxed the strength of the strongest forceps to dislodge it. The Von Eicken claw forceps in the Brüenings extension shaft is a very remarkable instrument, combining lightness of construction, strength, and an unyielding grip. Removal was accomplished by gradually revolving the piece on one fixed point of impaction. Recovery was uneventful.

Case 4. Girl aged 3 years. Large open safety pin in esophagus 3 hours Referred by Dr. Hartman, Wauseon. (No. 6 in Plate A and radiograph, Fig. 1.)

The mother's attempts at extraction had undoubtedly crowded the pin well into the esophagus and the natural efforts to swallow had worked the pin downward so that when the radiograph was taken the shield was about the level of the episternal notch and the point was exactly behind the sternoclavicular articulation. At the time of the operation the pin was still lower — 8 inches from incisors. On first thought removal by direct traction seemed like attempting to pull a large fishhook from a fish's gullet, but previous experience with two smaller open safety pins in infants gave me courage to attempt turning the pin. Careful measurements taken on the plate, and verified by a duplicate pin, showed that the point of the pin was 1¼ inches (3.2 cm.) from the outer edge of the shield, and the shaft of the pin was 1⅜ inches (3.5 cm.) long. It was clear that the esophagus was already stretched nearly 1¼ inches and that to turn the pin on the fixed point would stretch the esophagus only ¼ inch more.

Under ether anæsthesia the pin was readily seen, and with a hook I made traction on the shield until the pin was turned and easily extracted, the point dragging against the lateral wall of course. The pin point was slightly more distant from the shield than in the picture but there was absolutely no appreciable traumatism.

As stated I have used this method three times but this is the largest pin that I have ever removed in this way. Safety pins are now made of steel as well as brass and the operator should be sure of a larger margin of safety, as shown by plate measurements, before attempting to turn a steel pin. Once turned so that the spring coil loop is above the point there is little danger of severe traumatism in extracting by hook traction on the shield unless the pin has caused inflammatory softening. Turning should not be attempted if there is inflammatory edema. I have devised a snare for closing a safety pin which is demonstrated with other instruments. The Jackson and Mosher instruments are practical, and one of the methods of closing the pin should be resorted to if the turning method seems impractical and unsafe.

Case 5. Baby aged 8 months. Brass Christmas tree candleholder in esophagus 6 hours. (No. 8 in Plate A and radiograph, Fig. 2.)

A little sister put this brass thing into the infant's mouth. Like an open safety pin, pointed ends upward, it worked downward with every effort at deglutition. Unfortunately the mother nursed the baby just prior to the operation so that I found it lower down than it appears in the radiograph taken by Mr. Dachtler two hours earlier. The parents led us astray as to the nature of the foreign body as they thought it a triangular safety pin affair made of stiff brass. From the plate one could not determine the true nature nor which was the sharp end. Through the esophagoscope, the infant having been etherized, I could see the brass rosette located about an inch below the cricoid and grasped one of the prongs with forceps and pulled. It was a relief to find that the two prongs were flexible. Extraction was accomplished by bending the brass prongs double and half turning, and as neither end was sharp there was no traumatism. In 12 hours the baby was in normal condition.

The testimony of parents and attendants is often very confusing. I have almost reached the conclusion that unless they can show a duplicate and are absolutely positive their testimony should be ignored. I have had them assure me that the foreign body was a peanut shell when it was an open safety pin; a wood splinter when it was a sharp piece of steel; and have been called to treat for croup when it was a shirtwaist button, etc., and the lesson we all learn by experience is to try and take testimony only for what it is worth, and thus avoid unpleasant surprises.

Case 6. Boy, aged 8 years. Brass ferule with rubber eraser in one end and steel pen in the other in the left bronchus 5 days. No. 9 in Plate A. (Radiograph by Dr. L. M. Dolloway.)

When first seen this boy had a well developed bronchopneumonia temperature 103°, respirations 60, and con-

stant coughing. Very little air entered the left lung. Upper bronchoscopy contraindicated. Under ether-chloroform anæsthesia tracheotomy by Dr. Gillette. With the Killian bronchoscope I could readily see and grasp the steel pen inserted in the proximal end of the ferule. The sharp pen caught at the tracheal opening as I was about to extract and a sudden cough expelled the foreign body into the mouth. The pneumonia subsided gradually and recovery was without further incident.

CASE 7. Boy, aged 1½ years. Steel glass headed pin in left lower lobe bronchus 7 days. (No. 12 in Plate A.)

Measurements of pin, 1⅜ inches long, sharp steel point,

This infant was examined under anæsthesia immediately after the accident, and nothing was discovered by the surgeon. For six days the boy seemed fairly well, but occasionally he coughed and cried with pain. The family physician, Dr. O. S. Brigham, then took charge and though there were no urgent symptoms he exercised excellent judgment by taking him to Mr. Dachtler, who took two Roentgenographs. The plates were good but it required most careful study to locate the pin as it was behind the shadow of the heart and low in the left lower lobe bronchus. Operation: Assistants, Drs. Donnelly and Brigham. Taking into consideration the age, the bronchitis, and probable difficulty of liberating the point from swollen mucosa, I did a low tracheotomy. Ether anæsthesia. The small sized beveled tubular spatula was introduced, *the long lip toward the left*, so that I could straighten out the angle of the left bronchus without danger of impacting the point of the pin. This is quite an important method in searching for a pin as the non-beveled tube passed far enough to straighten the bronchial angle is quite likely to crowd the pin point into the mucosa before the shaft is seen. By this method I brought the main bronchus into view and could actually pass the long lip down alongside the pin without touching it and thus get a perfect view of the shaft and locate the point. The head of the pin was engaged in the left lower lobe bronchus and the point was concealed in the congested mucosa of the median wall of the main bronchus. Manipulations to release the point were thus made easy and the forceps blades grasping the shaft near the point were pressed over against the long lip of the tube to protect against catching the point during extraction. Recovery uneventful.

This case naturally brings up the question of selection of the *upper* or *lower method* — that is, *without* or *with* tracheotomy. In operations for extraction of such a foreign body as a sharp steel pin and those known to be from the nature of the body, size of the head, etc., located low down in a secondary bronchus; in fact, in all cases presenting unknown or unusual difficulties, I would say emphatically, *when in doubt do tracheotomy*. Brüenings, in "Zeitschrift für Ohrendeilkunde," December, 1910, advises preliminary tracheotomy in children under two years as a general surgical rule. The advantages are: (1) a short tube and more chance for manipulations to release an impacted point; (2) the opportunity is thus given to use the beveled tube and avoid the risk of impacting the pin point (I have had some of my Ingalls' tubes beveled and fenestrated to allow respiration in both bronchi); (3) the danger of losing the foreign body at the glottis or

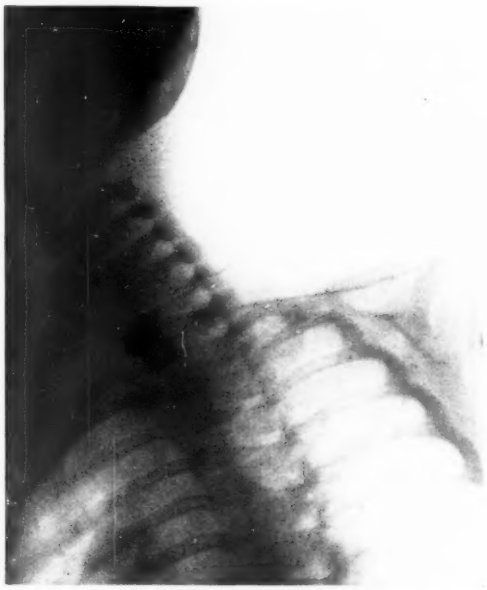

Fig. 2. Brass Christmas tree candle-holder in the esophagus. (Case 5.)

allowing it to drop back into either bronchus is lessened. (The latter accident may necessitate another radiograph to locate it, not to mention the danger of sudden asphyxiation in case one lung is already impervious to air.) I should add that in all of these cases in which tracheotomy was resorted to the trachea was freely incised and loops of silk were passed through each lip of the incision to aid in drawing the trachea up to the skin surface thereby making exploration by the tube much more easy. If it is desirable to keep the trachea open for a few days these retaining threads can be used to suture the tracheal edges to the skin, thus doing away with the canula.

CASE 8. Boy, aged 1½ years. Screw bolt in right lower lobe bronchus 4 days. Dimensions, ¾ inch by ⅜ inch with flattened screw head. Referred by Dr. J. Ohlinger. (No. 11 in Plate A and radiograph, Fig. 3.)

The radiograph by Mr. Dachtler located the bolt low down in the bronchus of the lower lobe of the right lung, and as it had been there 4 days and the fever and coughing indicated considerable bronchitis, I decided at once to do tracheotomy. The Killian bronchoscope was used and a perfect view of the end of the screw bolt was obtained. It was well down in the small bronchus, head downward and filled it like a reversed cork sunken into the neck of a bottle. None of my forceps blades could be made to enter alongside the foreign body. With cutting pliers I fashioned a small right angle hook with sharp feather edge and passed it alongside the bolt. The sharp hook when turned

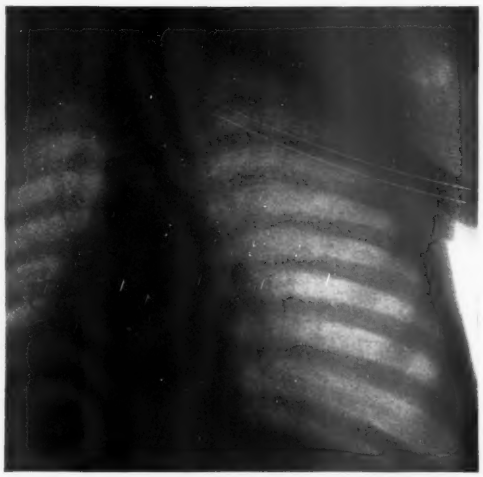

Fig. 3. Screw bolt in right lower lobe of bronchus. (Case 8.)

caught in the threads and a half hour of patient manipulation worked the bolt out until it could be grasped by the claw forceps and extracted. Recovery was without incident.

This case and others impressed on me the importance of hooks of various shapes in the armamentarium. Ingalls has particularly cautioned against using curved hooks as they are liable to become entangled, but the short right angle hook is not dangerous. I how have a variety of hooks and with cutting pliers at hand one can be adapted to the special indication as in the above case.

CASE 9. Woman, aged 40. Fragment of cement tooth filling in the lower lobe of the right lung 7 months. Referred by Dr. Tuttle of Van Wert. (No. 10 in Plate A and radiograph, Fig. 4.)

In February, 1910, Mrs. C. had submitted to extraction of twenty teeth under ether anæsthesia. On recovering she coughed violently, and for seven months she continued to cough with copious mucopurulent expectorations. During all of that time she had not reclined in bed, nor had she had more than two consecutive hours of sleep. There was consequently decided emaciation, and at times fever and she was thought to have consumption. The dentist and physician had accounted for all of the teeth extracted, but the patient persistently insisted that there was a foreign body in her lung. X-ray examination by fluoroscope was reported negative by a local Roentgenologist. In September Mr. Dachtler located the small fragment in a lower lobe bronchus, right lung, at the level of the ninth rib posteriorly.

Operation: ether anæsthesia. ¼ gr. morphine, $\frac{1}{100}$ atropine, ½ hour previous to operation. Assisted by Dr. Chas. M. Moots, I performed low tracheotomy and made a careful search for the body. The right lower lobe bronchus opened into a cavity nearly an inch in diameter, the wall of which was covered with granulating areas, and filled with pus and bloody mucus. The depth of this cavity was about eight inches from the tracheal opening. The Killian aspirator worked perfectly but even after a thorough cleaning out I could not see the foreign body. After an hour and a half search I desisted in attempts to locate it. Of course I was looking for a tooth not knowing at the time that it was a fragment of cement. One week later Mr. Dachtler mapped out the thorax by leaden strips and also secured beautiful stereopticon plates by which we could get a good perspective and exact depth. The foreign body was at that time one inch to the right of, and the same distance anterior to, the vertebral column, and at the level of the 9th rib posteriorly. Another trial was willingly consented to, and as soon as I had pumped out the cavity the fragment of cement was readily seen and extracted. Recovery was uneventful and a few months later she was reported to be in normal health.

Mrs. C. had several crowned teeth and this fragment was the filling under one of the crowns.

The stereopticon plates of Mr. Dachtler greatly facilitated accurate orientation so that I could pass the tube directly to the foreign body. The lesson one learns from this kind of case is to keep on trying. A small body in an abscess cavity is hard to find and the patient should be warned to forestall disappointment that more than one trial may be necessary. I think now that at the first attempt it was imbedded in granulations and I released it. The cleaning out of the cavity was helpful in that at the second trial there was not so much pus and blood encountered.

I cannot speak too highly of the Killian aspirator. It is large enough to suck out thick or flocculent masses with only the moderate suction force of the rubber bulb. I believe also that this method gives a decided advantage over the combination tube of Jackson in that it is not necessary to pass the bronchoscopic tube down into accumulated secretions and perhaps impinge on the foreign body to accomplish the cleaning out of the cavity. With the Killian method the bronchoscope is passed only to the depth giving good vision of the bronchus or cavity to be explored, and the same holds good in esophageal explorations. The aspirator tube is then passed deeper and gradually the pocket can be cleaned out. It seems like a rather awkward method but it is very satisfactory.

REMARKS ON LOCAL AND GENERAL ANÆSTHESIA

I use very little cocaine in adults and none in children in lower bronchoscopy. The method of drawing the trachea up to the skin surface by threads in either lip lessens the tracheal irritation very much, and I should add that the tube should be warmed and oiled, and with the patient properly etherized coughing is usually well controlled. Medium doses of morphine and atropine may be

given if indicated to adults prior to bronchoscopy, but as a rule it seems to me a bad practice to subject a patient, and especially children, to the uncertain combined effects of a variety of narcotics and an anæsthetic. It confuses the essential symptoms on which the anæsthetist depends. Profound anæsthesia, to the degree of abolishing all reflexes that interfere with vision and accurate instrumentation is absolutely necessary and the way to get it most safely is to depend entirely on a skillful anæsthetist. Dr. C. E. Price takes charge of that part of the operation, and invariably secures the proper degree of abolition of disturbing reflexes, and so far without even a suggestion of alarming symptoms. We have not as yet been forced to use oxygen on account of asphyxiation from inflammatory edema or incident to anæsthesia or accidental obstructions, but as a precaution have it always at hand for emergencies. Menthol vapor aids in producing bronchial anæsthesia and lessening the coughing incident to the passing of instruments.

I might add to these case reports a group of cases to the number of a dozen or more having foreign bodies in the larynx, trachea, or bronchi of the nature of kernels of corn, seeds, nut meats, and fragments of shells of the same, peanuts, etc., but as they present no features bearing on the Killian method or instrumentation detail reports are of no special interest. Only one such case died without operative attempt and that was a child who had aspirated fragments of peanuts during a paroxysm of whooping cough. Double pneumonia supervened and when first seen (four days after accident) she was *in extremis*. Autopsy revealed many fragments in both bronchi. Jackson considers peanut cases peculiarly liable to develop pneumonia, and undoubtedly it is due to the fact that fragments are aspirated into both bronchi.

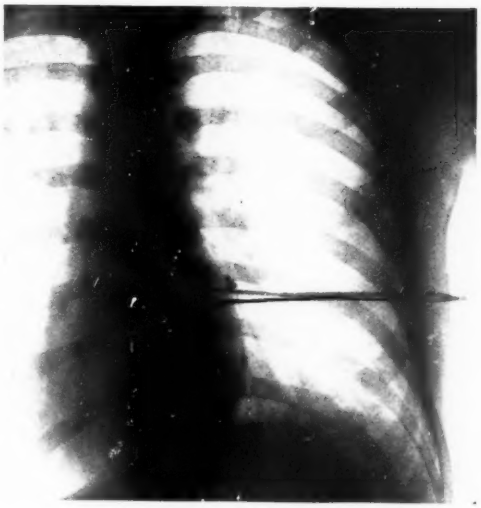

Fig. 4. Fragment of cement tooth filling in lower lobe of the right lung. (Case 9.)

REPAIR OF FRACTURES WITH STEEL SPLINTS

By E. H. BECKMAN, M. D., Rochester, Minnesota

THE attention of the general surgeon has been occupied to such an extent with the development of abdominal surgery that he has had little inclination to study the operative treatment of fractures. The orthopedic surgeons have made much progress in the past few years in the surgical treatment of joints and tendons, but they have been content to follow the teaching of twenty-five years ago in regard to fractures, with the result that surgery of bones has not kept pace with advances made in other lines of surgery. The use of the X-ray first showed us how very inferior our bone repair work has been.

The teaching of older surgeons in regard to the danger of infection in operating upon fractures, has been copied from one text-book to another down to the present time, until surgeons who have no hesitation in exposing a bone to remove an exostosis, a bone cyst, or to drain an osteomyelitis, hesitate to expose the same bone because it has been fractured. This teaching has led surgeons to be content with results in fractures that they would not tolerate in any other branch of surgery.

Infection in a bone is a serious matter, but with a healthy patient, proper preparation, good technique, and careful handling of the parts, infection should occur but rarely.

Judging from results, our experience seems to show that comparatively few fractures require

Fig. 1. Case 9278. Compound comminuted fracture of the ankle joint with dislocation. Front view.

Fig. 2. Case 9278. Side view, showing backward dislocation.

an open operation in order to restore to normal the function and deformity of the injured member. Because of non-union or deformity in old fractures, or the failure of the usual methods and appliances to reduce deformity and retain the fragments of bone in apposition in recent fractures, an open operation must frequently be resorted to. It is not to be presumed that the steel splint will take the place of all other methods of fixation, but in many cases it will be found to be a valuable aid, and with further experience its usefulness can be increased.

Long ago, builders learned that the best way to secure rigidity in a broken piece of long timber, was to fasten a cleat on the side of it. In the same way, when applied to the two fragments

Fig. 3. Case 9278. Side view after plating.

Fig. 4. Case 9278. Front view after plating. Fibula not plated.

of a long bone, the steel splint gives more rigidity and firmness than any other device we have yet seen.

Arbuthnot Lane, who is such an ardent advocate of the steel splint, has taught us that with proper technique a considerable amount of foreign material will heal *in situ*, with no discomfort to the patient and without retarding the healing process in the bone.

Cases for open operation. Fractures in which the deformity cannot be reduced and the fragments held in apposition by the usual methods; compound fractures, or compound comminuted fractures in which the deformity is great and the chances of proper replacement of the parts small, are best treated by the open method. In cases of non-union, or malunion, there is no other alternative. Where the fragments in the parallel bones approximate each other, fractures are best treated by the open method; this is often the only way in which rotation can be preserved, following fractures of the forearm.

Technique of operation. In operating upon fractures, the most thorough asepsis is essential for good results. It is well to fasten a towel to the edges of the wound after the skin incision is made so that no infective material can be conveyed from the skin into the open wound. Heavy rubber gloves should be worn, and in case they become torn, should be changed immediately. The practice of Arbuthnot Lane, of not allowing the hand to come in contact with the wound, is a good one to follow. In all cases, the periosteum should be protected; it should not be stripped from the bone, and as much of it as possible should be saved.

Proper instruments are quite essential in saving time and lessening traumatism to the manipulated parts. Long forceps, such as are used by Lane, Binney, and others, are particularly useful in retaining the fragments in place after a reduction has been accomplished. A good drill is essential. The Lohman clamp is of great assistance in holding the plate in place while it is being fastened to the bone. Some form of a screw-holder, to hold the screw while it is being started, is a wonderful saver of time and patience. In our experience, failure has been due more often to selecting a plate too short rather than too long. It is a mistake to put on a plate which contains less than two screws in either end on any long bone of considerable size. Experiments conducted by Martin seem to demonstrate that two screws holding a plate on to the shaft of a healthy bone will hold even to the breaking point of the plate. Occasionally, however, one meets a soft

Fig. 5. Fig. 6.

Fig. 5. Case 9926. Compound fracture of forearm with infection.

Fig. 6. Case 9926. The same after plating. These plates required removal later, but rotation was obtained.

bone in which more than two screws are required in each fragment. The screws should be long enough to penetrate the medulla of the bone but not pass through it. If the plate is made absolutely immovable at the time of operation, it is less likely to require removal later. After the plate has become fixed to the bone, all hæmorrhage should be controlled before closing the wound. A tourniquet may be used if it is thought advisable, but the chances of getting a permanent dry field are less if it is used. The soft parts should be carefully approximated so that no dead space is left to be filled with blood clots. If a large incision has been necessary, and much soft tissue exposed, or if there has been considerable traumatism, a drain made of folded gutta percha tissue placed down to the bone, is often desirable so that the first outpouring of blood and serum may find escape instead of remaining in the wound. This drain should be removed in

Fig. 7.

Fig. 8.

Fig. 9.

Fig. 7. Case 10569. Ununited fracture of the humerus; three months' duration.

Fig. 8. Case 10569. The same, two weeks after plating.

Fig. 9. Case 10569. The same taken two weeks later than Fig. 8, and showing great increase in callus. This plate also illustrates the proper depth for the screws to penetrate.

from twenty-four to forty-eight hours. It has been our practice in this clinic to put on a plaster cast immediately. If it has been necessary to drain, a window can be left for dressing the wound and removing the drain. In fractures of the femur the cast may be cut along the sides while still wet and the top of it lifted off so that the patient lies in a mould.

Diagnosis. When possible, every fracture should be photographed with the X-ray in two planes lying at ninety degrees to each other. A single X-ray plate is often misleading because it shows good alinement, while another, taken at an angle of ninety degrees to the first, will show great deformity. The X-ray should not be relied upon entirely, because in most instances it does not show rotation of the parts, and this rotation, in spite of perfect alinement, may be so great as to cause marked deformity. In one of our cases of fracture of the femur the rotation was so great, in spite of good alinement, that the toe of the affected side was turned directly toward the ankle of the opposite foot and it was exceedingly difficult even after the ends of the fragments were entirely free, to correct this rotation satisfactorily.

Time of operation. In reducing a recent fracture, if it is found impossible to get perfect reduction or to maintain it satisfactorily, it is best to operate immediately because, in this way, blood clots may be evacuated from the wound, lacerated muscles repaired, and time saved for the patient. If, however, the patient is not seen for two or three days following injury and the parts are edematous and a great deal of swelling is present, it has been our custom to wait until about the tenth day before operating. This allows the circulation, which has been temporarily

Fig. 10. Case 9264. Ununited fracture of the femur which had been wired elsewhere six months before coming under observation.

Fig. 11. Case 9264. Same as Fig. 10 after plating, plate not holding on account of infection and too few screws. Union finally occurred with enormous callus.

interfered with by swelling, to become re-established and it also allows the tissues to regain enough tone to take care of some added traumatism and possible infection. In talking personally with Mr. Lane, he said that he also followed this plan of waiting some days in case the patient had not been seen immediately, and extensive infiltration and edema were present. In case a compound fracture has become infected before it is seen, we have followed the practice of allowing a reasonable length of time for this infection to clear up before operating, or better still, to let the wound heal entirely.

Difficulties of operation. A means of approach to the site of fracture should be selected where the chance of injury to the muscles, blood supply, and nerves is but slight. This may be difficult in old fractures on account of callous formation. In operating upon the humerus particular care should be taken to avoid injury to the musculospiral nerve, which lies close to the bone, and is quite often caught in the callus. After the bone has been reached, the callus may interfere with freeing the ends, and with the reduction of the deformity. In these cases particular care should be taken to preserve the periosteum. In one of our cases the callus was so great that it was necessary to chisel it away from both sides of both fragments in order to reduce the deformity. After the ends of the fragments have been released, contraction of the large muscles, which have caused an overriding of the fragments, may seriously interfere with the approximation of the ends. Occasionally it is possible to project both

Fig. 12. Case 9264. Same case operated three months after Fig. 11. Primary union. Broken screws showing from previous operation.

fragments out through the wound, approximate their ends, and then gradually force them into position by lateral pressure. Martin's method of putting on a weight even up to 100 pounds or more for a few minutes at the time of operation, is a good one, and will be found of particular service in fractures of the femur. This method consists of direct extension upon the end of the bone of the distal fragment. A strip of heavy canvas is doubled and the loop placed over the end of the bone. The ends are carried down the sides of the limb and fastened to a rope running over a pulley and the heavy weight attached similar to the ordinary Buck's extension.

In ununited fractures extension for a few days before the operation is of assistance in overcoming the contraction of the muscles. One of the hardest deformities to overcome is rotation of one of the fragments.

Results. Our results with the use of the steel splint have been uniformly better in all classes of cases than by any other method of open operation. Infection has taken place in a few instances, but has not been of a serious nature, although in a few cases it was necessary to remove the plate and screws at a later operation. But even in these cases we have found that the plate has held long enough to insure union. If the plate is close to the skin, the chances for its remaining permanently seem to be lessened. It is possible to plate even in infected cases and get union, but in these cases one must expect the plate to be finally removed and the wound should be provided with ample drainage. In no instance, up to the present time, have we failed to get union after plating a bone and the patients are much more comfortable after this method of fixation in fractures than any other method we have tried. The freedom from pain is often surprising.

The accompanying illustrations were selected to show some of the cases in which the steel plate has given us better results than other methods of open operation.

REFERENCES

ARBUTHNOT LANE. Section on Surgery, Jl. A. M. A., 1909, p. 303–310

BINNEY. Operative Surgery, vol. ii. 1910.

MARTIN. Surgery, Gynecology and Obstetrics, Aug., 1911.

A SIMPLE PHOTOGRAPHIC APPARATUS FOR IMMEDIATE RECORD OF FRESH AND FIXED MACROSCOPIC AND MICROSCOPIC SECTIONS

By WILLIAM CARPENTER MacCARTY, M. D.
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IN the daily routine examination of fresh pathological specimens one necessarily sees many interesting, important, and rare microscopical pictures. In order to record these accurately it is necessary to have them immediately photographed or drawn. It requires some time to draw them and if one prefers to photograph them — perhaps the more accurate method of recording them — it is necessary, in nearly all laboratories, to change the slide from the routine microscope — with which they are generally found — to another microscope, which is used for photomicrographic work. Such a change necessitates a considerable loss of time as it is often difficult to locate the area to be recorded.

A desire to record accurately and quickly such pictures prompted the writer to design and build the apparatus which will be described.

This instrument — a modification of similar, but more complicated pieces of apparatus — was constructed to fulfill individual needs, and has the following advantages:

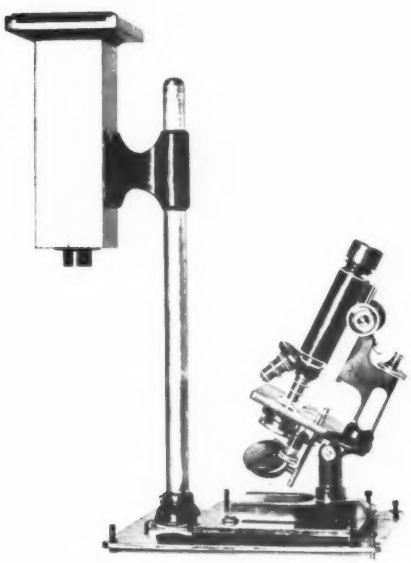

Fig. 1. The microscope and camera in position for routine examination.

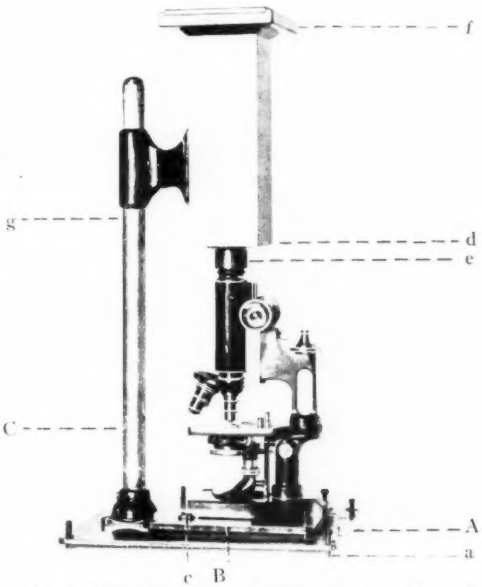

Fig. 2. The microscope and camera set for action. A, base plate. B, second plate upon which the microscope rests. C, upright tube which telescopes into the solid arm of the camera. a, adjustable screws for leveling. c, cleats to determine exact position of the microscope in its relation to the camera. d, position of the front board which telescopes into the collar (e). e, collar. f, the plate holder of the camera. g, the location of an adjustable flange is placed.

1. It allows one to make immediate photographic records of fresh tissues, especially the peculiarities of cells themselves.

2. It allows one to photograph any microscopic picture, which might be found during routine examinations, without changing the field or moving the slide to another microscope.

3. It may be adjusted for action in from one to five seconds, and after being used, may be moved from the microscope and returned to its place in an equally short time.

4. It will photograph a small rather than a

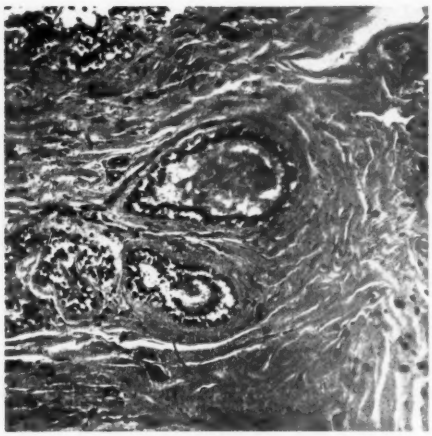

Fig. 3. Low power photomicrograph of chronic cystic mastitis showing the double row of epithelial cells.

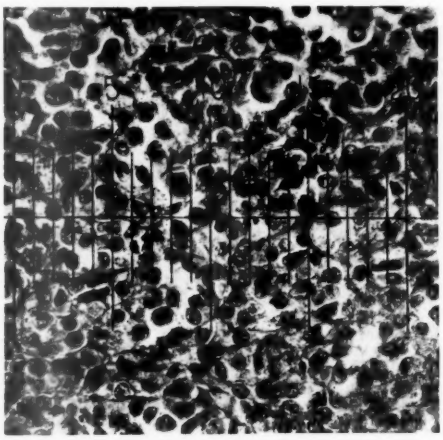

Fig. 4. Low power photomicrograph of a round cell sarcoma. The ocular scale which is photographed with the section is convenient for studying the relative size of the nuclei and cells.

large field, this having the advantage of immediately focusing the attention of the observer upon the object to be observed.

5. It will permit the recording of any interesting microscopical field, found by other workers in the laboratory, without changing of the slide to a special photographic microscope.

6. It is a rigid apparatus which allows the microscope and camera to vibrate practically in unison, thereby reducing vibration to a point beyond the limits of recognition by the naked eye.

7. It may be used to photograph small gross specimens as well as microscopic specimens.

The apparatus consists of a metal plate (A) (Figs. 1, 2) supported by four adjustable corner screws (a) and a second smaller plate (B) which is likewise supported at the four corners. Upon plate (B) rests a microscope which is held in place by two cleats (c). These hold the microscope at a definite distance from the upright (C) to which

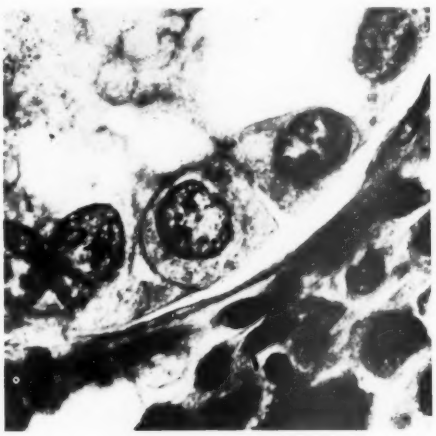

Fig. 5. High power photomicrograph of four epithelial cells in an acinus of a carcinoma of the breast. The central cell only is in focus.

Fig. 6. Balantidium coli in fresh feces.

a camera box is attached. The camera consists of a wooden box 10 x 3⅛ x 3⅛ inches. To one end (d) a metal collar (e) is attached. This telescopes into a collar which surrounds the ocular of the microscope. The camera front board is removable so that a similar front containing a 90 mm. or 60 mm. lens can be attached for photographing small gross specimens.

The plate holder (f) of the camera is made to hold a 3¼ x 4½ inch plate although the actual picture is 2½ x 2½ inches. (Plates of this size are more readily obtained and are more easily handled than the 2½ x 2½ inch size.) The camera is attached firmly to a solid arm which telescopes with the upright (C). A flange (g) is cut on the upright to prevent the camera from descending upon the microscope. This may be an adjustable flange to support the camera at various levels. Variation in level is usually dependent upon the length of the objectives. An automatic shutter is placed inside the box. The lenses of the microscope serve as camera lenses. The image which is cast is almost in focus at a distance of 10 inches which is the length of the camera. With this apparatus photomicrographs from 1 to 1,500 diameters may be made.

The writer utilizes a Schwann lamp of 1,000 candle power and allows the light to pass through a spherical condenser (Florens flask 1,000 cc.) into which any liquid ray filter may be placed. The light is reflected by the mirror of the microscope just as is done when using any artificial light. The apparatus minus the microscope, light, and condenser weighs 6½ kilos.

A SURGICAL KNIFE ON THE SAFETY RAZOR PRINCIPLE

By FRANK H. LAHEY, M. D., Boston, Massachusetts
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IT occurred to the writer that, since with safety razors it is possible to always have a sharp blade, the same might be true of surgical knives. So an attempt was made to design a blade holder which would be simple and effective, allowing no play in any direction, with a mechanism which permitted of complete sterilization, and at the same time did not interfere with one's grasp. With the advice of Mr. H. H. Brown of this city, and after many designs were considered and an unsatisfactory model made, the following seemed the best:

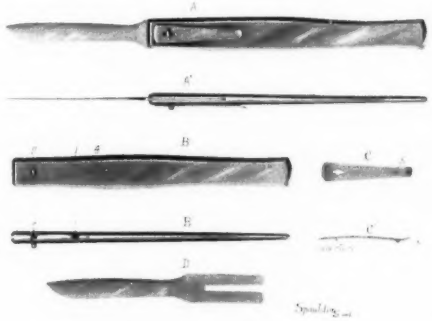


Figure A and A′ represents the knife complete.
Figure B and B′ the side and top view of the handle or blade holder.
Figure C and C′ the side and top view of the holding spring or clip.
Figure D the blade itself.

Figure B and B′ is the regular handle of a surgical knife, slotted as indicated in B′ by the arrow 3 to receive the blade shown in figure D. Penetrating the handle at points 1 and 2 are two pins over which the notch in the blade shown in D slips, thus providing for fixation in the upward and downward direction. Pin 1 shown in B and B′ is fixed on both sides of the handle, flush with the surface and covered by the nickeling so that it can be discerned only by looking closely for it. Pin 2 is fixed only on one side shown in B, playing through a round hole in the other side just large enough to receive it. On this side the pin presents a head of a more or less T shape (No. 2 in Fig. B and B′) running at right angles to the long axis of the knife handle. This is to fit the aperture in the clip shown in figure C. The small cup-like depression on figure B is for the tubercle marked 5 on figure C′ and holds the clip firmly fixed in one position, when it is applied with its long axis in the same direction as the handle.

Figures C and C′ represent the fixing or holding clip which provides for fixation in regard to lateral motion and prevents the blade from being withdrawn from its holder.

It will be noticed in figure C′ that the spring

contains a distinct bow so that, when the T head of pin 2 in figures B and B′ is inserted through the aperture and the spring turned so that it is in the same axis as the whole instrument, distinct lateral pressure is made between the two ends of the slotted handle, preventing the blade being pulled out while in use and at the same time providing stability as regards lateral motion. It may also be seen that the clip presents at the end on its flat surface a tubercle which fits into a small cuplike depression in the handle (point 4, figure B) to keep the clip fixed in the same place at all times when in use. At this same end will be seen in C′ the clip presenting a curve slightly reverse from the greater curve. This is that the nail may grasp the spring sufficiently to lift the tubercle out of its cup that the clip may be turned at right angles preparatory to removing the blade.

Figure D shows a side view of the notched blade of flexible steel. The notch has sufficient flare at its end to easily engage the pins as the blade is inserted into the slot.

Although in description this instrument may seem somewhat complicated it is evident from the illustrations that it is exceedingly simple. There is nothing to get out of order and nothing to wear. The blades are easily inserted and removed, and will stay firmly fixed in position when the spring clip is applied. As shown by illustrations A′ and A there is nothing on the handle to interfere with the grasp.

The knife may be sterilized as easily as the one piece knife. The handle and clip may be put in to boil with the other instruments of the kit and the blades dropped into alcohol or boiled as desired.

It has been suggested to me that the flexible steel in the blade might allow of side to side motion sufficiently to interfere with its efficacy. I have been using these blades for the last three months and have experienced no inconvenience in that direction at any time. In straight incisions the blade follows through the skin as it is drawn from one point to another. Once it penetrates the skin it does not deviate unless the guiding hand does also. For curved incisions it is superior to a stiff blade as the slight flexibility of the steel allows the blade to accommodate itself somewhat to the curve.

Another advantage of the safety razor blade is, that the thin steel cuts through skin with much less effort than the thick more wedge-shaped scalpel. The thin steel also provides a much more delicate edge for fine dissections, being between that of a regular scalpel and that of a razor.

As for balance, thanks to the manufacturers, no knife could be more satisfactory.

Since writing this description two knives with detachable blades, both manufactured in Germany, have been called to the writer's attention. One, called the "Sektor" knife, has a thin blade of safety razor steel and clamps between two handles very much like thumb forceps. The other, known as the "Record" knife, has thick blades similar to those of a regular scalpel and makes no claim to a razor edge. These knives do not in any way resemble the one described here.

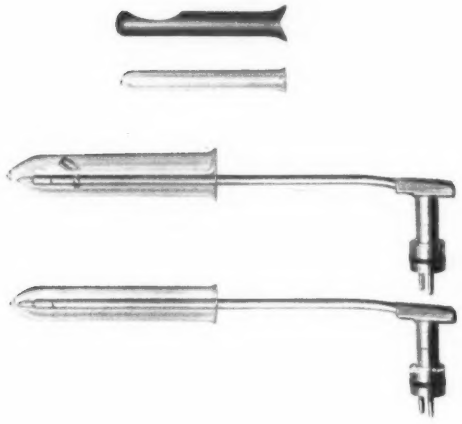
MODIFICATION OF SKENE'S FEMALE URETHROSCOPE

By EDGAR GARCEAU, M. D., Boston, Massachusetts

THE female urethroscopes in general use present certain disadvantages which make an examination of the female urethra unsatisfactory. The spring-wire variety which attempts to open the urethra by expansion of its walls does this imperfectly and at best discloses only a portion of the canal. So also the tubular endoscope which is so commonly used is not, in the author's experience, well adapted for the purpose. Only a small portion of the urethra is seen at one time with this instrument and then in an unnatural condition with the canal presenting as a rosette at the end of the tube. Lesions are thus disclosed in a distorted manner and may be misinterpreted.

The old Skene urethroscope consists of two parts, an outer glass tube of very small caliber (figure 1) and a small mirror mounted on a shaft which slides back and forth in the glass tube. By means of reflected light thrown into the tube by a laryngoscopic head mirror a small portion of the urethra is brought into view by means of the small mirror in the tube. By manipulating the small mirror the whole urethra is successively examined.

It will be found that the Skene urethroscope is not a satisfactory instrument because it is so small. The tube is of such small caliber (No. 20 Fr.) that enough reflected light cannot enter to properly illuminate its interior. The



Figs. 1, 2 and 3.

result is that the pictures presented are dark, wanting in detail, and are visible with difficulty.

The author has modified the Skene instrument in two ways: firstly, by using urethral glass tubes of larger bore (Nos. 30 to 36 Fr.); secondly, by employing a different method of illumination. The tubes are represented in figures 2 and 3. They have conical ends and are easily introduced in the female urethra with or without preliminary dilatation of the meatus. The cone tip usually suffices to dilate as it enters, but occasionally it will be found advisable to slightly dilate the meatus with a conical dilator as a preliminary measure. For a light a small electric bulb is used which is mounted in the end of a shaft. This is introduced into the glass urethral tube. As the diameters of the electric light bulb and the shaft are equal there are no backward rays to confuse the examiner, in fact the electric loop is not seen at all. If desired a small mirror (figure 2) may be clasped on to the shaft of the electric apparatus. The author has found that the urethra can be inspected quite as well without the small mirror as with it. By tipping the glass tube with the finger it is possible to bring into relief any portion of the canal and to observe it minutely. For the deeper portions of the canal, however, the mirror is an aid. As the

Fig. 4.

mirror slides up and down the shaft it may be used or dispensed with at will.

It was at first feared that areas of pathologic congestion would be temporarily obliterated by pressure of the tubes, but it was found that this was not the case. These areas remain unaffected by pressure and stand out plainly. The author wishes to mention in this connection circular areas of congestion which he has seen with the instrument. These areas are a few millimeters wide and extend around the urethral canal as a perfectly regular band. They have never before been seen by him with any other kind of urethroscope. They are frequently found in cases sometimes diagnosed as "irritable bladder."

These tubes may be introduced without preliminary local anæsthesia in the great majority of cases. When, however, there is a tight meatus a solution of novacain applied to the meatus and the canal with a cotton stick produces enough anæsthesia to allow of painless dilatation and introduction.

For the treatment of urethral lesions requiring local applications the best kind of instrument is the Ives' speculum (figure 4) which the author has modified for this purpose. It is a simple short endoscopic tube with a notch cut into its distal end. It is introduced with an obturator and turned on its axis until the notch is in contact with the diseased area which has previously been localized with the urethroscope. The obturator is withdrawn and this leaves the diseased portion prolapsing into the notch. Applications are now easily made.

AN OPERATION FOR THE RELIEF OF WRIST-DROP AND ALLIED CONDITIONS[1]

By THEODORE G. DAVIS, M. D., and THEODORE G. FINLEY, M. D., Los Angeles, California

IT may be said that most persons are familiar with wrist-drop, even outside of the profession of medicine.

Accidents or injuries occurring during birth, as traction with fingers, or by hook in axilla, may injure the brachial plexus; forcible rotation or excessive lateral extension of the child's head during delivery of the shoulder may rupture the cervical roots forming the outer, inner, or posterior cords and cause a flail-arm or hand.

Hematoma within the sterno-cleido-mastoid and other muscles may by pressure injure these nerves. Excessive traction or pressure upon the arms, or fracture of the humerus near insertion of the deltoid muscle, even a separation fracture of the clavicle during birth, or in the early years of life, and the means used for its retention, may be followed by wrist-drop.

A cervical rib, particularly of the sixth vertebra, even of the seventh, may by its presence injure the nerve roots or cords and cause wrist-drop. Sudden violent contraction of the triceps muscle has been followed by wrist-drop.

Acute poliomyelitis, or a multiple neuritis occurring during the course of, or as a sequel to, the acute infectious diseases — scarlet fever, influenza, typhoid or cerebro-spinal fever and diphtheria, may be followed by wrist-drop and become permanent. Then we have the occupation neuroses and "craft palsies," excessive piano-playing, the typewriter, or long continued use of the forearm in ordinary writing, especially if associated with the use of alcohol or tobacco; and very commonly the wrist-drop of lead poisoning, in painters, printers, and workers in lead, etc.

In later life many traumatisms may be followed by wrist-drop, as crutch paralysis, fracture of the neck of the scapula, or of the humerus at its surgical neck, dislocation forward of the head of the humerus, particularly where forcible attempts at reduction with foot in the axilla and strong traction upon the arm is made.

The most common accidents followed by wrist-drop are fractures of the humerus between the insertion of the deltoid muscle and the point at which the musculo-spiral nerve pierces the external intermuscular septum between the insertion of the brachialis anticus and the origin of the supinator longus muscles — about 2½ inches above the articular surface of the external condyle. It is here the musculo-spiral nerve branches, forming the articular, posterior interosseous and radial nerves. Oblique fracture of the external condyle extending into the joint, or dislocation of the head of the radius upward, may, by pressure upon these nerves in their descent on the anterior surface of the external condyle, cause paralysis of the extensor muscles, with wrist-drop.

The case which leads to the preparation of this paper is that of F. J. E., 37 years of age, who, eight years ago, February 5, 1900, was injured by a bullet entering the anterior surface of radial side of the right forearm three inches below the articular head of the radius; the arm being in a raised and flexed position across the chest. The bullet passed upward, backward, and inward, shattering the humerus 2¾ inches above the articular surface of the outer condyle, dividing the musculo-spiral nerve. Wrist-drop immediately followed.

The injured parts were adjusted, a splint applied, and the wound left open for drainage. No effort was made to find and suture the divided nerve, or to wire the fragments. Owing to the stiffness of the elbow joint which followed, six weeks after the injury (under anæsthesia) forcible movements were made. Possibly separation of the bony fragments occurred at this time and passed unnoticed. The splints were reapplied and the arm bandaged. Anyway we have imperfect alignment and bad anatomical result; although fairly good functionally.

Seven months after the injury an incision was made in an effort to find and suture the ends of the divided musculo-spiral nerve; this resulted in failure, the surgeon stating that "more than three inches of the nerve had been destroyed." The paralysis of the extensor muscles, with "wrist-drop" which had immediately followed the injury, continued. The patient was obliged to use a splint extending into the palm of the hand to support the wrist, that he might do anything. The holding of a pen, pencil, or other instrument was otherwise impossible.

Continued bandaging upon the splint and disuse caused atrophy of the muscles of the forearm and hand, the grasping and holding functions lessened, and the arm became of little service, practically useless.

He applied to me for relief. Nerve suture, or grafting, as well as grafting or transplantation of tendons, appeared impracticable and useless.

We decided to make an endeavor to *fix the joint* in a position which would enable him to write and exercise the grasping, holding, and carrying functions — believing a more or less stiff wrist would be of greater service than a flail-like drop-wrist. The result has justified this decision, the hand being permanently fixed by union of bone,

[1] Read before the Southern California Medical Society, at Santa Ana, California.

callus, and connective tissue, in a slightly elevated position of permanent extension.

The patient can pick up a pin, a sheet of paper, take up a pen or pencil and write, use a knife or fork, button and unbutton his clothing, grasp, lift, and carry to the extent of 150 pounds, and, indeed, can do what he has been unable to do for more than eight years, and is happy to be employed as a warehouseman handling plumbers' supplies. At the present time, June, 1911, he states "I scarcely know or experience any difference in the use of my hands; with the right I can do almost anything fully as well as with the left." The muscles of the arm — except the extensors of the carpus — have redeveloped and acquired their usual strength.

THE OPERATION

On May 22, 1908, an incision two inches in length was made over the right radiocarpal articulation along the radial border of the extensor communis digitorum tendons, beginning about one-half inch above the articular surface of the radius and extending over the metacarpal bone of middle finger, careful retraction of tendons and blunt dissection of tissues being made until the articulations of the wrist and hand were laid bare.

The hand was then forcibly flexed and the wrist joint opened, carefully avoiding injury to the radioulnar articulation and the articulations of the thumb, index, and little fingers.

The synovial membrane and cartilage was removed from the articular surface of the radius, the bases of the third and fourth metacarpal bones, and from between the bones of the carpus involved in this operation.

The radius was drilled from its posterior or upper surface obliquely downward into the articular space, both on the outer and ulnar side; the scaphoid, os magnum, semilunar, and unciform bones were drilled in like manner, the bones of the third and fourth metacarpal bones being drilled transversely. Removal of bone from the more or less convex surface of the carpal bones by gouge and sharp curette was necessary, that we might pass a No. 20 bronze wire continuously through the outer drilling of the third and fourth metacarpal bones, the unciform and semilunar bones, and the remaining perforation in the radius.

The hand was then placed upon a splint for support, in a position of exaggerated dorsal extension, slightly beyond that we desired to obtain. The wound was cleansed with hot water, the drilled bones adjusted, the wire drawn tightly, the ends being twisted over the lower end of the radius, bringing the denuded surfaces of the bones in close apposition, with the hope of obtaining union of bones. The constricting band was removed, the hæmorrhage checked by compression and hot water, the inner tissues coaptated by catgut, careful adjustment and suture of ligaments and tendon sheaths being made.

Condition of wrist and hand after operation, showing the union of carpal bones to each other and to radius.

The skin was closed by subcuticular silkworm gut suture, dressings were applied, and the forearm bandaged upon the retention splint.

Slight oozing of blood and synovial fluid occurred for three days, but almost perfect primary union was obtained. The twisted ends of wire irritated the synovial sheaths in some measure, and a small sinus was produced. Being desirous of obtaining bony union this was allowed to continue until the end of the seventh week, when the tract was opened up, the wire cut and removed by twisting and traction, the wound packed, and allowed to heal. At no time was there any infection.

After the eighth week the splint was removed

X-ray picture of a case of so-called "Congenital Dislocation of Carpus upon Flexor Surface of Radius," to which this operation may be applied.

at times and gentle movements encouraged, until the confidence of the patient warranted discontinuance of the splint. The result is far better than we anticipated, callus and bone having been formed between the denuded surfaces, giving permanent support. You will remember we avoided disturbing the articulation of the ulna, the thumb, index, and little fingers.

The patient can rotate the forearm to a considerable extent; supination, however, is lessened by the bad position and other conditions at the point of injury above the elbow joint. He can approximate the thumb, index, and little finger, has very good flexion of hand and fingers, with excellent grasping, holding, and carrying functions. Not only will this operation relieve traumatic wrist-drop, but those due to toxæmias and cortical lesions; at least it will relieve the deformity.

CONGENITAL FLAIL-HANDS

This operation can be extended to the relief of "congenital flail-hands" (of which I show you a skiagraph by the courtesy of Dr. Donald J. Frick), not only for the cosmetic effect, but with the hopeful possibility of enabling the afflicted one to acquire some use of the hand.

Congenital flail-hands are but a variety of wrist-drop accentuated by the absence of bones. I use the plural, for they are always bilateral and usually identical. In the majority of cases the radius is absent. Fowler says "the radius is always absent." This is not true, for I have seen skiagraphs where the radius was present, along with the upper part of the ulna, forming an excellent elbow joint, the lower half of the ulna being absent, while the upper part was fused with the shaft of the radius. In this variety the carpus is more nearly normal, but as a rule some of the bones of the carpus are missing. The thumb, if present, is usually ill-formed and useless; but when the radius is present the thumb is more nearly perfect and we ought to be able to make the hand of some service, at least we can lessen the deformity.

In these cases careful examinations should be made early in life by aid of the X-rays, and skiagraphs made from time to time. Much of the deformity being due to contraction of the flexor muscles, particularly the flexors of the carpus, corrective apparatus should be applied and manipulations made to lessen the deformity, due to muscular shortening and the atrophy of disuse.

Operation cannot well be done until after the tenth year, when the bones of the carpus become ossified, yet I do not believe it necessary to wait until the twentieth year when ossification of the

bones of the forearm is completed. I would suggest it might well be done during the eleventh or twelfth year.

Efficiency of the muscles should be tested, skiagraphs made with the forearm and hand in different positions, each case being carefully studied. In some cases removal of one or more bones of the carpus, or a portion of the lower extremity of the bone of the forearm, may need be made. Careful removal of the synovia and cartilage from the articular surfaces of the bones involved in the operation, should be made, drilling and wiring them together as previously described, and fixing them to the bone of the forearm which may be present, upon a splint, in that position which will best correct the deformity,

With the sincere hope that this operation may add to individual usefulness and the sum total of human happiness, I submit it to you and the profession at large.

THE USE OF THE SPHYGMOMANOMETER DURING SURGICAL OPERATIONS

By H. K. THOMS, M. D., New London, Connecticut

ALTHOUGH the clinical use of the sphygmomanometer is well established, its use in connection with surgical procedure is in no way as general. That the use of the instrument during operations is not more universal is singular, especially when its advantages are considered. Where the determination of blood pressure is used in this connection, the usual procedure is to record the pressure just before, and immediately after, operation. There is no doubt that in this way we have a valuable aid to the diagnosis of surgical shock, but we have no means of knowing how long such shock, if present, has supervened.

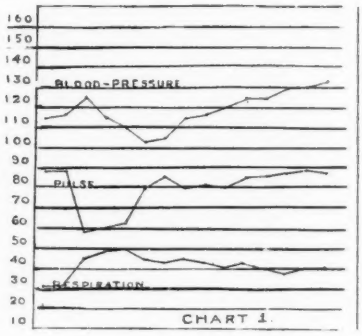
It is the purpose of this paper to emphasize the importance of recording the systolic blood pressure, together with the pulse and respiration, at five minute intervals. By this means we not only have an indication of shock when present, but an indication of the exact time when such shock has become manifest, and also to a great extent the amount present. I have used the procedure in my work at the Memorial hospital with Dr. H. M. Lee, for the past six months, and the results have been so convincing that it has become routine in major operations.

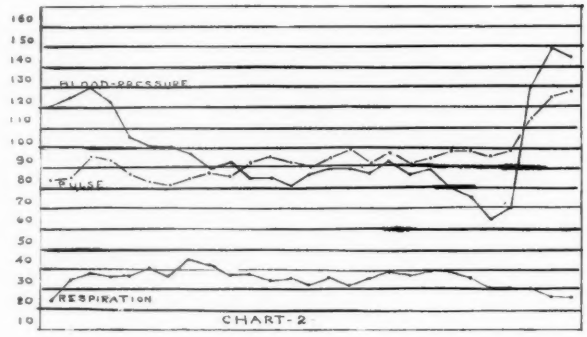
For this purpose we have used a sphygmomanometer of the dial type, namely, the Tycos instrument. This has been employed because of its simplicity and more especially its small size. It has proven quite as accurate as the mercury column for this purpose.

The determinations and charting are put in charge of one of the surgical nurses, who does nothing else during the operation, thus leaving the anæsthetist wholly to the anæsthesia.

In operations below the thorax, the pulse and pressure are taken at the arm and wrist. In work upon the head, neck, or thorax, the determinations are readily made at the foot of the patient, placing the apparatus around the ankle and using the dorsalis pedis artery for palpation. Of course there are variations in blood pressure during operation which we might call more or less normal, and these must be duly considered in the interpretation of the readings. Any cutting operation causes an initial rise. Also when any of the large nerve trunks are irritated we may expect a greater reflex rise. Opening the peritoneal cavity is usually accompanied by a sharp rise followed by a more or less fall of blood pressure, dependent upon the amount of exposure and manipulation of the viscera. Even large amounts of ether seldom produce any marked fall of blood pressure.

The accompanying charts demonstrate two types of cases that are often met with in surgical work. The first is that of an operation for a tumor of the broad ligament. We have the usual initial rise, accompanied by the fall due to the manipulation and removal of the tumor mass. Following this is a gradual rise until the finish of the operation. This is the type of case that is spoken of as "reacting well" at operation. The second chart is that of a patient with malignant disease requiring complete hysterectomy at operation. The initial rise and fall in this case is not succeeded by the gradual rise as before. We find instead that the pressure hovers between 80 and 90 mm. and we may safely say at this point that surgical shock has become a factor to be taken into consideration. Subsequently we see a gradual fall to 60 mm. and there is no doubt now that





surgical shock has become manifest and must be combated. At this point 600 cc. of normal saline with adrenalin was given intravenously and the sharp rise shows the influence of such procedure.

It is obvious that the greatest value of the determination of blood pressure at frequent intervals is from the standpoint of the anæsthetist. It is his duty not only to give satisfactory narcosis but he must at all times be cognizant of the exact condition of the patient. So much depends in the personal element on his part that any procedure by which this can be more or less eliminated, must certainly be welcome. Not only has he a means of knowing the condition of the patient in regard to surgical shock, but he can also by comparison of the previous readings, determine to a great extent the amount of shock, if present. The treatment of shock is also more successful, for by this means we can institute treatment at a time when it can be said to be almost prophylactic. Such measures as the intravenous injection of saline can be instituted at the beginning of shock by an assistant and no delay in operation is made. It is our custom also to chart the steps of operation at the proper time and these charts form a valuable addition to the history and clinical charts.

EXCISION OF INTERNAL JUGULAR VEIN[1]

For Streptococcic Thrombi of Vein and Cavernous Sinus Causing Paralysis of Orbital Muscles

By JOHN WESLEY LONG, M. D., Greensboro, North Carolina

THIS paper is based upon the following unique case:

Personal history. D. M., white, age 28, single, occupation machinist, a native North Carolinian, born of healthy parentage, has always enjoyed vigorous health with the exception of the usual diseases of childhood and malaria six years ago. He has never had chronic headache, throat, nose, or ear trouble, diphtheria, pneumonia, or chronic cough, stomach, or kidney trouble. His habits are exemplary, using no intoxicants and smoking only ten cents worth of tobacco a week.

Present illness. November 24, 1909, the young man was seized with a chill and fever and complained of sore throat. Next morning Dr. Parran Jarboe saw the patient and found his temperature 102.8°, pulse 110, fauces swollen with deposit on both tonsils. A smear from the throat showed no Klebs-Löffler bacilli but the presence of streptococci. Patient had another chill in the afternoon. On the night of the 26th the patient had two chills, both tonsils were by this time covered with a thick membrane, temperature 103.8°, pulse 120. Another chill occurred on the 27th and on this date Dr. G. F. Ross confirmed the microscopic findings, the streptococci being abundant. By this time a small peritonsillar abscess had formed, this was opened by Dr. Jarboe evacuting half

[1] Read before the Tri-State Medical Society of Virginia and the Carolinas, February 14, 1911.

ounce of greenish pus. On the 28th the patient complained of his left eye and asked that something cold be applied, this was done for a few hours after which it was noticed that the upper lid was swollen and red.

December 1st the writer saw the case with Dr. Jarboe. At this time the pseudomembrane had partially disappeared from the throat, but the inflammation was more intense, especially on the left side, seemingly involving the whole thickness of the neck from mucosa to skin, the parts inside and out being infiltrated and swollen. In the hopes of reaching an abscess an incision was made deeply into the peritonsillar tissues on the left but only serum and blood were discharged. In addition to the usual remedies that had been employed antistreptococci serum was given. The next morning the symptoms were better only to grow rapidly worse as night approached. The patient had been delirious most of the time since he became ill and a part of the time wildly so, requiring one or two attendants to keep him on the bed. His temperature ranged from 99° to 104° and pulse from 100 to 140. He complained of great distress generally with pains in his throat, head, and left eye.

At my suggestion Dr. C. W. Banner examined the patient December 3d. He found the blindness of the left eye due to hæmorrhage into the vitreous humor. Ptosis of the left lid was present to a moderate degree but the movements of the ball were fairly normal.

December 5th a blood count by Dr. W. F. Cole showed R. B. C. 4,608,000; W. B. C. 18,800; differential count:

	Per cent
Polymorp. neutrophiles leucocytes	84.8
Polymorp. eosinophiles leucocytes	.3
Small mononeuclear leucocytes	13.6
Large mononeuclear leucocytes	1.3

A conference of all the attending physicians was held and a diagnosis of "septic thrombi of the internal jugular vein" was made and operation advised. This diagnosis was based on the microscopic findings, the profound toxic symptoms, the daily chills, the wide fluctuations of temperature and pulse, the delirium, the inflammatory condition involving the left side of throat and neck, and the left eye ptosis with the absence of pus in the peritonsillar tissues.

The patient was removed to St. Leo's Hospital December 5, 1909.

Operation. Operation was done December 6th. On this date the pulse was 120, heart's action very weak, temperature 103°, respiration 36, but no râles or bronchial breathing, a trace of albumin was present and the patient was very restless and delirious. The W. B. C. were 17,600. The anæsthesia and operation lasted but forty minutes. An incision was made from the mastoid process to the sternum, exposing widespread infiltration of the tissues also numerous small suppurating glands. The internal jugular vein was easily located and found to be distended and brawny as were its many branches. The vein was ligated and excised from its exit at the jugular foramen close to its entrance into the innominate. Its larger tributaries, the common facial and thyroids were also ligated. Other important structures, such as the vagus, spinal accessory, and carotids were studiously avoided.

The resulting wound was extensive, at least five by three inches. No attempt was made to close it but it was filled loosely with iodoform gauze. To finish with the wound, the sides were gradually approximated till by the time it was healed only a linear scar remained. The spinal accessory nerve which was exposed for two inches was carefully protected during the healing process and suffered no loss of function.

Pathological report. The pathological report by Dr. Cole, who aided me throughout in the management of this case, showed the excised vein to be filled with thrombi and pus containing abundance of streptococci.

This patient made a remarkable recovery but his convalescence was not uneventful by any means. Indeed his life literally "hung in the balance" for many days. In the meantime numerous complications arose.

I submit a brief synopsis of the postoperative history.

The patient remained in the hospital seventy days.

Kidneys. At the time of operation a trace of albumin was present but no casts were found. The next day granular casts appeared and persisted for a while. Albumin was present till the latter part of January.

Lungs. While the respiration was frequent (36) at the time of operation no pulmonary lesions were discoverable. December 9th a few fine râles were heard in both apices and in the base of the right lung. Cough soon developed. The symptoms and physical signs of bronchopneumonia increased in severity and extent and continued for many weeks; indeed, the bronchopneumonia came near destroying the patient's life.

A curious thing happened in connection with the terminal stage of this complication. Sometime in May, by which time the lungs had cleared

up and only a little bronchial irritation remained producing a hacking cough, the patient was using as an inhalent equal parts of spirits of chloroform, alcohol, and beechwood creosote. At the same time he was using a lotion for the left eye. By mistake the creosote mixture was put in the eye, whereupon the cough ceased at once to return no more. The eye recovered from the application after a few days.

Abscesses. December 12th an abscess was noticed above and including the right sterno-clavicular articulation. From this five ounces of thick pus was evacuated. The pus had burrowed through the joint completely disarticulating it. Eventually this abscess healed and the joint became solid again. Early in January a much larger abscess formed at the right side of the root of the neck and later pointed in the axilla underneath the pectoral muscles and was opened. This abscess caused much distress, fever, and dense adhesions in the axillary region, impairing temporarily the arm function. Before the patient left the hospital the discharge from this abscess had become a mere dribble but it persisted for a long while afterward, which is explained by the fact that on July 6th the young man returned to the hospital when a search revealed a drainage tube in the axilla. Possibly other glands too deep to be discovered suppurated which helped to produce the irregular fever.

Chills. The patient had a chill, sometimes two, every day from the beginning of the attack till the operation on December 6th; after this he had only two, one December 11th, following which the temperature went to 105°, and another on December 13th.

Blood count. The blood record is imperfect, but I give it for what it is worth.

	R. B. C.	W. B. C.
December 5	4,608,000	18,800
December 6 (Day of operation)		17,600
December 8		22,400
December 11		13,800
December 12		12,200
December 18	3,416,000	13,400
December 24	2,890,000	.....
January 9, 1910	3,648,000	16,000

Hemog. 50 per cent.

Delirium. Delirium was present from the first, particularly at night and for weeks both day and night. It was of the noisy, restless type. By the latter part of December this had largely disappeared. Christmas Day was the first time the patient recollects anything. After this he gradually became more and more rational and the restlessness coincidentally vanished.

Temperature. The temperature curve was very irregular, being characteristic of sepsis. During the first several weeks it had to be taken in the axilla or rectum because of the delirium. Bear in mind that we had, on the whole, three fever producing lesions to deal with, all due to the same primary cause it is true. It is quite probable that the temperature during the first three weeks was due largely to the initial infection, the cervical adeno-cellulitis, and the phlebitis. From the third to the sixth week the suppurating glands (abscesses) played an important part, while later the bronchopneumonia added its fuel to the flame and certainly prolonged the febrile movement, which continued long after all visible suppuration, except that from the axillary sinus which contained the drainage tube, had ceased.

The eye. Barring the recovery of the patient and the venous thrombi the chief interest centers about the eye. It has already been stated that there was swelling of the left upper lid with ptosis and hæmorrhage into the vitreous humor and blindness before the patient was removed to the hospital. The vision improved quite markedly following the operation though it did not become normal. December 31st, the following bedside note was made. "Patient has had normal temperature for two days, for the first time. He complains of pain in the left eye, the upper lid droops very much and this morning the eye is almost closed." January 3d. "Patient has been doing well but the ptosis is complete and he has lost the power to move the eyeball in any direction, the pupil is widely dilated and fails to react to light. Patient is still able to recognize large objects with left eye though vision is far less than it was a week or two ago."

The orbital muscles and the pupillary constrictor were evidently paralyzed. This condition continued for many weeks. In April, 1910, the eyeball could be moved a tiny bit only. During May the improvement continued; in fact there has been a steady gain in the muscle function till this writing February 14, 1911. The superior and inferior recti have as yet but little motion, but all of the other muscles, including the levator superior palpebrum and the constrictor of the iris, have almost regained their function, though the action is rather sluggish, making accommodation imperfect.

It seems quite evident then that the loss of vision was due in the first instance to the hæmorrhage into the vitreous humor and later the loss

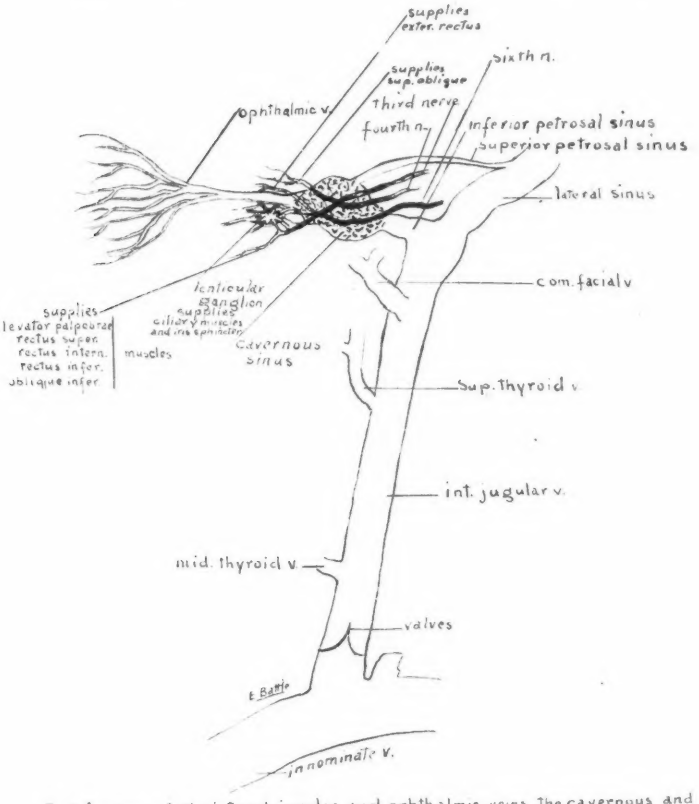


Fig. I Anatomy of the internal jugular and ophthalmic veins, the cavernous and petrosal sinuses, the third, fourth and sixth nerves, drawn semi-schematically; showing, first, the connection between the internal jugular vein and cavernous sinus, and second, the third, fourth and sixth nerves passing through the cavernous sinus on their way to the orbit.

of accommodation from muscle paralysis, while the fixation of the eyeball was also caused by paralysis of the orbital muscles.

An intelligent understanding of the conditions producing the impairment of eye function seen in this case invites a brief discussion of the anatomy and physiology of the parts involved.

Anatomy of the veins. The internal jugular vein receives all the blood from the side of the head and neck except that which passes through the deep cervical, vertebral, lowest thyroids, and external jugular. The internal jugular vein commences in the jugular fossa of the temporal bone and terminates in the innominate vein. Near its lower end are found two valves. Its chief tributaries are the meningeal sinuses which in turn have as their principal feeders the cerebral and the ophthalmic veins. In the neck the jugular is joined by the facial and thyroids. In this system of veins and sinuses *the important connecting link between the internal jugular and the orbital veins is the petrosal and cavernous sinuses* (Fig. I). The sinuses are peculiar blood channels, usually of great width, have no valves, are devoid of muscular tissue and are separated from the dura only by the endothelial lining of the sinus wall. They receive the blood from the entire brain, the eye, internal ear, and bones of the skull.

Muscles and nerves of the eye. As is well known the eyeball is controlled by six muscles whose combined function gives the eye its universal range of motion. With these muscles is associated the levator palpebræ superioris.

This group of muscles is enervated by the third,

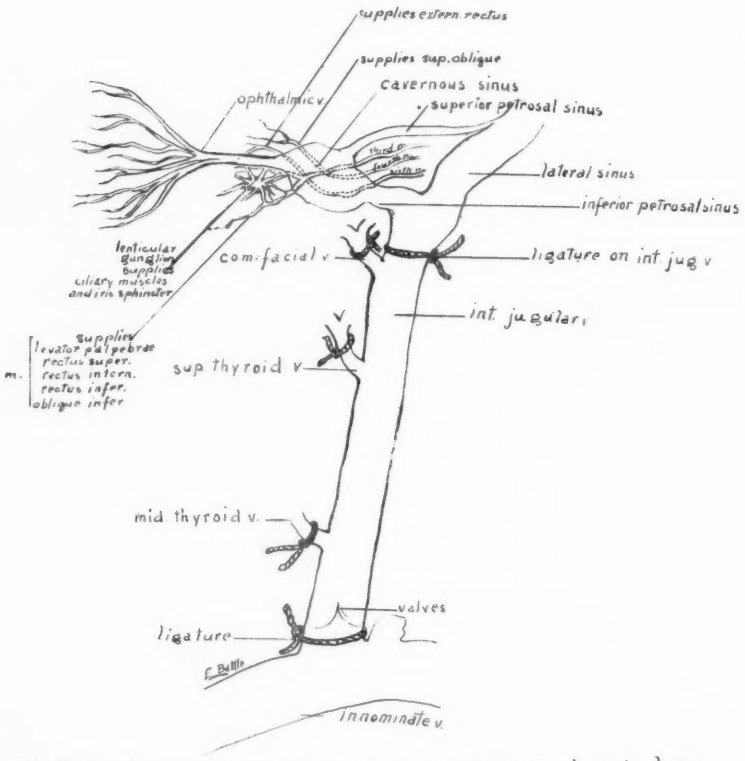


Fig. II. Dr. Long's case of septic thrombi of the internal jugular vein, demonstrating how the thrombi may extend upward through the inferior petrosal sinus into the cavernous sinus involving the orbital nerves.

fourth, and sixth nerves, the third also supplying the pupillary constrictor. The third or oculomotor nerve leaves the brain just in front of the pons Variolii, pierces the dura mater and courses through the outer wall of the cavernous sinus, entering the orbit through the sphenoidal fissure. The fourth or trochlear nerve emerges from the dorsal surface of the mid-brain, passing around the falx cerebri it appears at the base of the brain behind the optic track, running forward it pierces the dura mater and traverses a narrow canal in the upper lateral wall of the cavernous sinus. The sixth or abducens nerve leaves the brain at the junction of the pons and medulla, it penetrates the dura mater in the posterior cranial fossa and sinks into the cavernous sinus through which it passes for a long distance almost horizontally lying closely lateral to the internal carotid artery and so reaches the superior orbital fissure. The nerves are separated from the venous blood as they pass through the cavernous sinus *only by the endothelial lining of the sinus.*

The anatomical and pathological relations. With the above anatomical picture in mind it is easy to account for the pathology found in the case reported. Let us see how our anatomy and pathology fit into each other. First, we have the internal jugular vein which has among its tributaries the petrosal and cavernous sinuses and ophthalmic vein. Second, the nerves supplying the muscles contained in the orbital cavity, including the iris, pass directly through the cavernous sinus being separated from the venous blood only by the endothelial lining of the sinus wall. Third, the patient has a streptococcic infection producing a pseudomembrane in the fauces, septic infiltration of the throat and neck, and thrombi of the left internal jugular vein. Fourth, early in the attack the left eye begins to pain, the lid swells, vision is obscured by a hæm-

orrhage into the vitreous and later paralysis of all the orbital muscles develops with consequently a fixed ball, a dilated pupil, ptosis with loss of vision from lack of accommodation. Fifth, the most rational conclusion to my mind is that *the thrombi extended up from the internal jugular through the inferior petrosal sinus into the cavernous sinus* (Fig. II), *possibly higher into the ophthalmic vein, setting up a septic neuritis of the third, fourth, and sixth nerves, the probable point of infection of the nerves being where they traverse the cavernous sinus.*

Other hypotheses might be entertained. Either that the thrombi extended to the origin of the nerves or that the muscle paralysis was due to the toxins acting directly upon the muscle fiber. The former is improbable it seems to me, since, while the third and fourth nerves arise from the floor of the aqueduct of Sylvius, the sixth nerve arises from the basilar portion of the lower pons, too remote from each other and the jugular vein as well to suppose that the thrombi extended to these points, especially in the presence of a more reasonable explanation. The theory that the muscle paralysis was due to toxins acting directly on the muscles is scarcely tenable, even in a septic case, when the anatomical relation of the nerves and venous blood in the cavernous sinus is remembered, together with the demonstrated fact that the internal jugular and all its accessible tributaries were filled with purulent streptococcic thrombi.

Be it observed that I have not referred to the blood changes that induce the formation of thrombus or the pathology found in the walls of the veins, or even to the relation of streptococci to thrombophlebitis, the proprieties of the occasion forbid such a prolonged discussion of a single case, but am content to simply state the facts as found, feeling assured that this unusual case is one of considerable interest and offers much food for thought. To that end I invite the consideration and criticism of this distinguished body.

INJURIES TO THE ELBOW IN CHILDHOOD, STUDIED IN RELATION TO THE DEVELOPMENT OF THE JOINT[1]

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THE elbow joint is very frequently injured, more frequently in children than in adults. There is a marked difference between the nature and extent of the injuries to this joint in childhood and in adult life. This we might expect from a study of the development of the elbow. An X-ray picture of the elbow joint at eighteen months bears only a slight resemblance to one at eighteen years. A radiogram at this age shows only the shafts of the humerus, radius, and ulna. The lower end of the humerus is somewhat widened, but the whole articular surface together with the internal and external condyle is still unossified. The radial head does not appear, the whole of the olecranon is still undeveloped, leaving the greater sigmoid notch apparently very shallow.

From the first to the twelfth year the following centers of ossification appear and develop. During the second year appears the capitellum, which forms the greater part of the lower humeral epiphysis and articulates with the radial head. During the fifth year the radial head and the internal condyle appear. Not until the tenth year does the olecranon develop and about the same time the trochlea, which articulates with the ulna. Last of all the external condyle at the thirteenth year. (Fig. 1.) At a certain age, then, the radiogram of a child's elbow will present the following bony parts separate and distinct from one another: 1. Shaft of the humerus. 2. Shaft of the ulna. 3. Shaft of the radius. 4. Head of radius. 5. Capitellum. 6. The trochlea. 7. The olecranon. 8. The external condyle. 9. Internal condyle. At a glance the joint would seem to be pretty well broken up even without an injury.

Still these differences in bony structure between the child and the adult do not make so much difference in the nature and extent of injury as would at first appear. The cartilage of the child seems relatively nearly as strong as the bone of the adult, and the ligaments of the child seem to be relatively stronger; but the ratio of strength between bone, cartilage, and ligaments in the child, seems to be all against the bone. When anything gives way it is in most cases the bone.

To keep within the limits of this paper it will

[1] Read before the West Tennessee Medical Association, May 14, 1911.

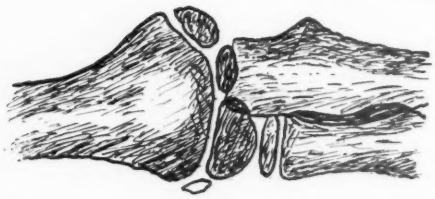


Fig. 1. Antero-posterior view of elbow at age of thirteen years. Reduced X-ray tracing.

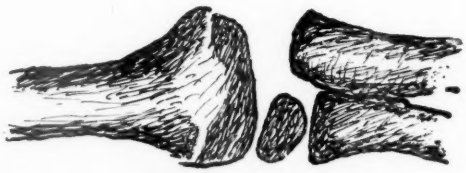


Fig. 3. Antero-posterior view of fracture through olecranon fossa. Age four years. Reduced X-ray tracing.

be impossible to discuss at length all the injuries that may occur about the elbow joint. But I think I shall be able to cover seventy-five per cent of all cases by discussing one fracture only, namely, transverse fracture of the humerus through the olecranon fossa. (Figs. 2 and 3.) The humerus at this point is wider and thinner, and in children especially, weaker than at any other. This fracture is low down on the shaft (figure 3) from one-fourth to one-half inch above the epiphyseal line (figure 4), and from three-fourths to one and one-fourth inches from the end of the bone. The dislocation, so far as I have seen, is invariably the upper fragment or shaft of the humerus forward, the lower fragment carrying with it the whole elbow joint backward. (Fig. 5.) There is also usually some lateral dislocation. (Fig. 6.)

The deformity in this fracture is almost exactly that given by two other conditions, namely, dislocation with the humerus forward, and separation of the epiphysis with the diathesis forward. But of these two conditions the former is comparatively rare in children, while the latter practically never occurs. In examining hundreds of X-ray plates of children's elbows I have never yet seen an epiphyseal separation. I have heard of them often but when the X-ray plate is made it is never a separation but always a fracture low down on the humerus through the olecranon fossa.

Scudder in his last book on fractures makes this mistake. He has several pages of text on epiphyseal separations illustrated by more than a dozen cuts from X-ray plates. Without an exception they are fractures, well above the epiphyseal line, and not separations. (Figs. 4 and 6.)

Given then a serious injury to a child's elbow, and I will venture the assertion that in seventy-five to eighty per cent of all cases it will be this fracture, transverse fracture of the humerus through the thinnest and weakest part of the bone, the olecranon fossa. (Fig. 7.) It will hardly be a dislocation, because they are extremely rare in childhood. It will not be a fracture of either condyle or of the olecranon, because the cartilaginous state of these parts causes them to yield rather than to break. The radial head will not be split or crushed as is frequently the case in adults because it is not yet sufficiently ossified. But to be absolutely sure of the lesion with which we are dealing, a radiogram of the injured joint should be made.

Most of the books on surgery say that every injury to the elbow should be examined under an anæsthetic. To this I cannot at all agree. It may have been good advice twenty years ago but not to-day. If it is at all possible the examinations should be made by means of the X-ray picture. And this for the following reasons: 1. It

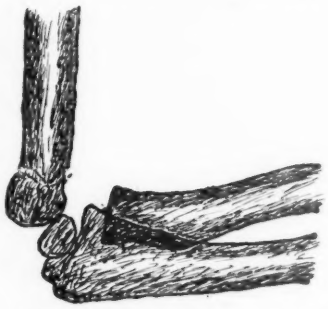


Fig. 2. Lateral view of fracture through olecranon fossa, three weeks standing. Arm was put up in extreme flexion. Note perfect result. Age four years. Reduced X-ray tracing.

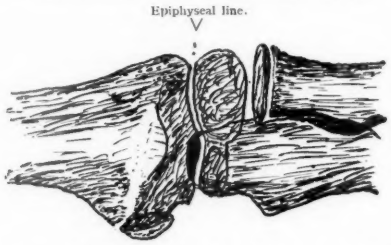


Fig. 4. Fracture through olecranon fossa. Age thirteen years. Reduced X-ray tracing.

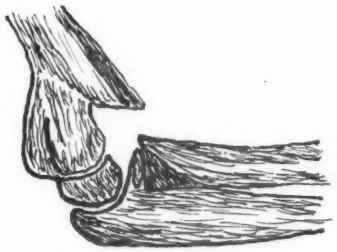


Fig. 5. Lateral view of fracture through olecranon fossa. Note lower fragment with joint displaced backward. Age six years. Reduced X-ray tracing.

is full, accurate, and complete as no other method is. 2. It is absolutely safe and painless, and does not subject the patient to any present or future inconvenience or distress, while in every anæsthetic there is a certain element of danger, to say nothing of the disagreeable after effects. 3. It obviates the danger of converting by manipulation an incomplete (figure 4) into a complete fracture with displacement of the fragments. 4. By showing clearly the nature and extent of the injury (figure 6) the position of the fragments, the angle and the slope of the lines of fracture, it indicates clearly what movements would be most likely to restore the fragments to their proper place, and more important still, what position of the arm would be most likely to keep them there. 5. It gives the surgeon an accurate record of the case, and if the nature of the injury is such as to make a good result unlikely or impossible, his prognosis will at least be correct, and the plate will stand to justify what might otherwise have been regarded as poor surgery.

Having then made the radiogram, finding a fracture through the olecranon fossa, and having

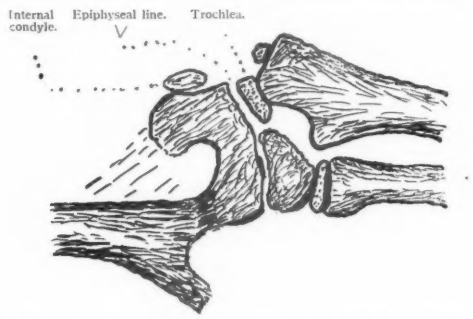


Fig. 6. Antero-posterior view of fracture through olecranon fossa. Note lateral displacement. Age twelve. Reduced X-ray tracing.

Fig. 7. Incomplete fracture through olecranon fossa. Age six years. Reduced X-ray tracing.

replaced the fragments as nearly as possible, the next step is still more difficult, namely, to keep them in correct position. This is to some extent accomplished by means of suitable splints but to a far greater extent by putting up the arm in such a position that the fragments will tend to remain in place as long as the arm is kept in this position with little or no pressure from without by means of splints or straps. And here is the one point of this paper: the best position in which to put up a child's arm that has been fractured through the olecranon fossa. There is such a position. And it is not the classical right angle position.

Fractured elbows have been put up at right angles since surgery begun with the idea that if we get a stiff elbow it is better stiff in this position than any other. But we do not expect to get a stiff elbow. There is no reason why we should. The joint proper is not involved in this fracture. Stiff elbows result in this fracture when the shaft of the humerus is left projecting forward (figure 5), ready to come in contact with the caracoid process of the ulna when flexion is attempted. It is obstructive stiffness from malposition and not inevitable traumatic ankylosis. Stick less closely to the right angle in putting up elbow fractures.

Even with a fractured olecranon (figure 9), I suppose it would be possible to bring the fragments into apposition with the arm at right angle, but how foolish it would be to expect a splint and

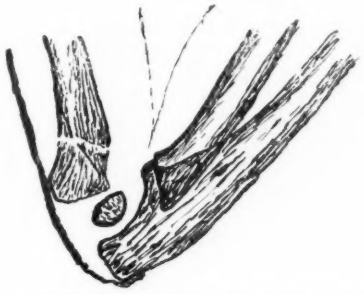


Fig. 8. Position of flexion not quite extreme enough. Note tendon of triceps forcing lower fragment forward. Reduced X-ray tracing.

adhesive plaster to hold them there when the anæsthetic was over, and the triceps again alive and at work. Here, of course, we put the arm up in extension and rob the triceps of its power to pull the smaller fragment from its proper position. In other words we put up the arm in that position which gives the fragments the best chance to remain in apposition when once put there, with a minimum of outside pressure from splints, pads, and straps. Here we are not afraid to depart from the right angle position, nor do we expect to get a stiff elbow.

Now the proper position for an arm with a humerus fractured through the olecranon fossa is not in extension, is not at right angles, but is the position of extreme flexion. (Fig. 8.) Not so extreme as to cut off the radial pulse, but as extreme as you can get it without doing this. In this position the muscles of the forearm together with the biceps form a natural pad to force the upper fragment back, while the tendon of the triceps, stretched tight by the extreme flexion, forms a natural posterior splint close to the bone which pushes the lower fragment forward and overcomes its tendency to become disengaged from the shaft of the bone.

This extreme flexion is best maintained by strapping the arm and hand to the chest with adhesive plaster, leaving the point of the elbow free or covered with a very light bandage. Of course light gauze and talcum powder must be put in the fold of the elbow. A light splint may be moulded to fit the elbow but I do not think it does much good and possibly harm in hot weather.

In conclusion the points I wish to make are these: 1. That the osseous structure of a child's elbow joint differs very materially from that of the adult. 2. That epiphyseal separation practically never takes place at this joint. 3. That a very large per cent of all serious injuries to the child's elbow joint are fractures of the humerus through the olecranon fossa. 4. Last and by far the most important, that the best position in which to put up this fracture is that of extreme flexion.

PAPYRUS EBERS

Important Editorial Comment

Some time ago, announcement was made through the pages of this journal that Dr. Carl H. von Klein had completed an English translation of the Papyrus Ebers, and that its publication in book form depended upon an advance subscription list of one thousand names. As a result of that announcement and the interest shown by Dr. von Klein's friends, six hundred subscriptions have been secured. The enterprise drags at this point and something must be done to arouse the profession to the importance of preserving this valuable manuscript. Four hundred additional subscriptions must be secured.

The Editor has had an opportunity to examine the elaborate manuscript, which is preserved with the greatest care and affection by the venerable translator, and one realizes how important it is that the author of the translation should see the ideal work of his life through the press. It is a question, in fact, whether the translation will not be lost to science just as Ebers' work was lost to us, by the author taking it with him to his bier, if he is not spared to finish the work of publication.

Dr. von Klein has spent twenty years of odd moments of a busy, useful life, mostly devoted to the literature of our profession, on this work of love, and it will be regrettable if it is now lost when so little will not only preserve it to us, the profession, but give its faithful author the satisfaction of seeing it in print.

The book will consist of 650 pages, 7 x 10 inches, in two colors (red and black) similar to the original, with six plates, bound in one volume. Subscriptions may be sent directly to Dr. Carl H. von Klein, Medical Department, John Crerar Library, Chicago, Illinois. Dr. von Klein will publish this volumn personally, and it will be sold only on subscription.

Editor Surgery, Gynecology and Obstetrics: Please correct an error in my paper entitled "Getting Up Early," etc., on the Gatch bed. The priority for the plan of getting patients up early after operation belongs to my friend Dr. Emil Ries, and not to my good friend Dr. Hermann Boldt, as stated.

Howard A. Kelly.

Baltimore, Maryland.

TRANSACTIONS OF SOCIETIES

THE THIRD INTERNATIONAL CONGRESS OF SURGERY

HELD AT BRUSSELS SEPTEMBER 25 TO 29, 1911

ORIGINAL REPORT BY CARL BECK, M. D., CHICAGO, ILLINOIS

The attendance of the Congress was pre-eminently French, with a slight sprinkling of English, German, Italian and American. The Congress was not so well attended as the two former, the absence of German surgeons being particularly noticeable, which may be accounted for, however, by the fact that the "Deutsche Naturforscherversammlung" met at the same time at Karlsruhe. Consequently, little other than discussions in French could be heard. A cordial and bourgoise tone reigned throughout, most members greeting each other like old chums. Of American representatives I counted ten. Particularly prominent was the old, ever young, Dr. W. Keen of Philadelphia, Dr. LeConte, Dr. Gibson, Dr. Lutz, Dr. Matas, Dr. Kammerer, Dr. Harte and Dr. Powers. Our country's representation was one to be proud of, especially in the discussions, since their clear and to the point diction was in contrast rather advantageously with those of some European confreres.

The first day was consumed with formalities. On the second day the honorary president, Minister Berryer, opened the Congress with a eulogy of surgery of the present time.

After short addresses by Depage, Willems, and Lorthoir, Prof. Championière, the president, opened the scientific program and immediately the members plunged into active work. It was evident that the secretary had worked out a good system by which the time would be utilized to greatest advantage. He planned a symposia on Pancreatitis, Lung Surgery and the Surgical Treatment of Colitis.

The arrangement was splendid: Three important themes had been selected to be hammered to palpable truths, and such to be accepted by the other surgeons of the world.

Most of the authorities were very concise and it was a pleasure to listen to them.

(1) *Pancreatitis*, its diagnosis, was the first theme. Dr. Michel (France) was the reporter. He gave a good description of the symptoms and his own experiences in regard to diagnosis on authentic cases and laid particular stress on an acute dilatation of the large bowel and pain in the lumbar region. This symptom aided him greatly in ascertaining the diagnosis. He also discussed the validity of the different chemical tests and pronounced most of them unsafe and useless. In the discussion Dr. Santos (Lisbon) called attention to the lumbar pain in embolisms, particularly in the kidney, and cited personal experiences.

(2) *Treatment of Pancreatitis.* Koerte (Berlin) laid down the rule that pancreatitis ought to be operated upon as soon as diagnosed; the pancreas ought to be incised, and bluntly prepared for drainage. He brought statistics of his service and those of his associate, Brentano, which showed that early operative treatment and drainage in the non-gangrenous and non-suppurative cases gave fairly good results.

Giordano (Venice) related a series of three cases with interesting histories. (One recovery.)

Several members made casuistic remarks, showing the general tendency toward early operative treatment, though Schumacher (Haag) objected to Koerte's "incision" of the pancreas for purposes of drainage, whereupon Koerte replied that he made only "scarifications" and eventually blunt dilatation with forceps.

THIRD DAY.

(1) *Pneumothorax and emphysema.* Reporter, Prof. Garrè (Bonn). The referent discussed the advantages and disadvantages of the different pressure apparatus used in lung surgery (Sauerbruch, Brauer and a number of others), and stated that he could do most of his operations without any of them. He thinks the Auer-Meltzer apparatus has a future on account of its simplicity. He lays great stress on the necessity of preventing a pneumothorax during chest operations. Ribera (Spain) reports some cases.

MACEWEN (Glasgow) brings a very interesting observation in reference to the collapse of the

lung. His explanation, which is new and somewhat differs from that of physiologists, is that it is not the negative air pressure which allows the lung to collapse in opening of the chest cavity, but that the absence of cohesion between the visceral and costal pleura is responsible for it. He cites the experiment of old physics with two moist plates of leather, also two glass plates, which cannot be separated by traction on account of the cohesion, and thus by analogy supports his theory that the cohesion of costal and visceral pleura is keeping the lung from collapse. His method to obviate pneumothorax, therefore, has been making lung and pleura costalis adhere.

(2) *Emphysema.* Garrè reports his personal experience with the operation of W. A. Freund (Strassburg) of removing the chondral portion of the ribs in cases of emphysema on account of their stiffness, which is due to pathologic changes in the same. He also shows, by plaster models, the difference in the rib angle in the normal and emphysemaous chests, also the difference in the costal arch.

(3) *Suppurative pleurisy.* Report by Dr. Gaudier (France). He finds the etiology of the suppuration in most of the cases pneumococcus, and he is in favor of an incision and drainage in such cases.

VAN VERTS (Lille) uses aspirations as well as operations.

BÉRARD (Lyons) is for incision; in some instances, however, he injects oil and recommends the ventilation of the pleura with oxygen.

RIBERA (Spain) reports cases.

DOLLINGER (Budapest) describes with precision his methods on his clinic based upon indications from a bacteriologic standpoint. Pure pneumococcus infection must be opened and drained; it closes spontaneously. Infections of putrid character also are drained, but they often develop chronic fistulæ. Tubercular effusions must not be touched surgically; they are injected with 100–150 cc. Iodoform-oil, which procedure is sometimes repeated.

PRINGLE (Glasgow) lays stress on opening of the pleural abscess as early as feasible, since by delay chances for the formation of fistulæ is increased.

MACEWEN recommends wide opening in operations without the use of any hyper-or hypo-pressure apparatus; no drainage tubes, as they irritate and lead to fistulæ.

VIGNARD (Lyons) describes an apparatus which prevents the soiling of dressing, of the bed, etc., in a patient having drainage.

KEEN (Phila.) calls special attention to Carrel using the Auer-Meltzer method in operations on dogs with great success, and describes an operation he saw at the Rockefeller Institute with both lungs, heart, œsophagus, etc., exposed and a resection of the aorta, and one hour after the operation the dog was lively again. He recommends the use of this apparatus, which has been employed in America in about 100 cases, to the European surgeons.

(4) GIRARD (Geneva) *Pleural fistulæ.* Report. He goes into etiology, and particularly, the diagnosis of pleural fistulæ, and dwells to some extent on the treatment with Beck's bismuth paste, which has done him great service in diagnosing cavities, but he does not use it in large cavities for fear of intoxication. He thinks that in the hands of the author it may be absolutely safe, but others ought to be careful. He describes the different methods of operations of resistant cases.

MAUCLAIRE (Paris) describes interesting cases of fistulæ.

LAMBOTTE (Anvers) is in favor of decortication of the lungs.

CECI (Pisa) describes a new method of thoracoplasty which differs some from that of Schede. His experiences have been in favor of operation in cases of long standing.

VAN VERTS (Lille) operates all fistulæ by laying the tract wide open.

AFTERNOON SESSION — WOUNDS OF LUNG.

(5) LENORMAND (Paris) reports present views on *Wounds of the Pleura Pulmonal* cavity. He relates his experiences in gunshot and lacerated wounds of the thorax, and calls attention to Garrè's statistics and Delorme's rules, which favor surgical action in the cases of the more serious injuries of the chest.

His report brought out a very lively (and it seemed to me somewhat passionate) discussion, in which a good many men took part.

DERNJINSKI (Moscow) and PSALTOW (Smyrna) report gunshot wounds, the first treating with operative, the latter with conservative, methods, both obtaining good results.

MAUCLAIRE (Paris) laid down the rule that injuries of the thorax ought to be divided *à priori* into three classes, such of light, medium and severe character. In the first class no one would think of interfering, in the severe cases neither, because they die at any rate; in the medium class one ought to consider and wait for intervention (be ready " :armé").

MACEWEN (Glasgow) calls attention to an early experience (1873) when he treated successfully a lacerated circular-saw wound of the chest and

observed then that the principle of adhesion prevented pneumothorax.

LEJARS seemed to strike the nail on the head when he laid down the rule that in the class of medium character one should take increasing dyspnœa or concealed hæmorrhage as an indication for intervention, and immediately there seemed to be forming three classes among those present: 1, Interventionists; 2, non-interventionists, and 3, those who were relative, or occasional interventionists.

PEUGNIEZ (Amiens) and also Thédenat (Paris) gave their opinions in favor of conservative methods, both of whom had considerable experience.

CAPLESCO (Bucharest), a pupil of Jonnescu, started a storm when he reported a number of successfully operated cases and asked only for clean water and soap as requirements for a good success, whereupon Jonnescu, his teacher, got up and related three very severe cases, in which he did not do anything, notwithstanding the increasing symptoms and the patients nevertheless got well, an experience quite contrary to that of his pupil.

Nevertheless, he insisted that surgical interference in every case was indicated and that in our times allowing a patient to die without giving him a chance which surgery offers would be a crime. This provoked quite a storm among those present, and PEUGNIEZ called on Jonnescu to explain the paradox, which he did.

GARRÈ told the audience that he favored active interference under strict indications, and that it seems to him that this is the tendency among the surgeons of the present day.

LECONTE (Phila.) had recommended for the past fifteen years the artificial pneumothorax in gunshot wounds of the chest as means of stopping hæmorrhage, and has had ample experience which bears out his expectation. In most instances it has proven successful.

At the close of the session President Championière got up and amidst great applause said this discussion reminded him of one in France, on a similar subject, the treatment of chest wounds and they always arrived at the same conclusion, that is, at none. He protested vigorously against the stand taken by Jonnescu, "that non-interference is a crime" even in our times.

(6) *Tumors of the lung.* The paper of Ferguson (Chicago) was read by Dr. Gibson. It stated very exactly the present views on thorax tumors, particularly the presence of primary carcinoma of the lung. He also went into the description of hydatids at some length.

MACEWEN (Glasgow) related interesting cases of tumors and operations from his long and vast experience.

KÜMMEL (Hamburg) stated that from his point of view the surgeons ought to take more interest in the group of pathologic changes.

FOURTH DAY.

The morning was devoted to the demonstration of fractures and devices to treat same. Several halls and rooms were set apart and contained models of casts, instruments and braces, X-ray plates and pictures, among which those of Dollinger (Budapest), Steinman (Bern), Championière (Paris), Lambotte (Anvers), Depage (Brussels), Codivilla (Bologna) were the most interesting. Dollinger explained his ambulatory casts and showed some interesting X-ray pictures. The most interesting, however, was the explanation of Steinman, who showed us on plates and drawings the history of the development of nail-extension, winding up with the latest models used. There are many points about this method which showed to me its great merits, particularly in neglected faulty unions of fractured long bones.

LAMBOTTE had the most extensive array of plates of fractures I have ever seen, and some among them showed such improvement that I thought it almost impossible, as for instance, the nailing of the head of the humerous with great destruction of the bones and afterwards absolutely normal conditions with the nails in place.

Among the different apparatus which were shown, one impressed me with its simplicity. It was the apparatus of Zuppinger, lately modified by Dr. Lorentz of Prague. It is simple, and very useful for the treatment of fractures with traction on the fragments by the weight of the body.

CORDIVILLA (Bologna) had a most interesting array of plaster models of injured limbs, which gave the best demonstration of his method of nail extension, application of casts and treatment of deformities.

The Germans had a great number of hyper and hypo pressure apparatus with combinations for anæsthesia. Some of them seemed to me very complicated and impractical, and will probably never be employed at the operating-table. Particular interest was shown to some new instruments for lung and intestinal surgery.

In the afternoon there was a general session, at which America was chosen as the next place of meeting, three years hence. From what I could glean from private conversations, the Europeans seem anxious to see the new and so successful

country of which they now have different opinion than years ago, and the men who were representing this country at the Congress were to a great extent responsible for this enthusiasm. If one looked at the beaming face of Dr. LeConte, the jovial and almost French Dr. Gibson, the amiable Dr. Matas, Dr. Kammerer, Dr. Powers and Dr. Harte, one could not help thinking that Americans certainly would make a surgical congress a great success.

Dr. DePage was elected president.

Following the general meeting was the discussion of the (1) *Abscess and gangrene of the lung.*

VAN STOCKUM (Rotterdam) laid particular stress upon the diagnosis and recommended fluorescopy as much safer means for diagnosis than skiagraphy.

MACEWEN (Glasgow) showed some pictures of cases of lung abscesses and gangrene and tubercular abscesses, treated by operations, some cured for years. He observed that when one lung was cured by operation, the other one improved. In one case he made a complete extirpation, and patient is not only living but is now employed.

TUFFIER (Paris) related three interesting cases with lung cavities which he treated in a very remarkable manner, namely, by grafting into the thorax wall in one case a large lipoma, in two others of epiploon, which he saved in cold storage for some time. He based this treatment upon the observation that the stiff wall of the cavity could not collapse irrespective of the pathologic changes (la nature) of the cavity. By separating carefully the pleura costalis he created a cavity between ribs and pleura costalis, into which he implanted epiploon and lipoma. The grafts healed in, and in one case he could, eight days afterward, satisfy himself that the graft had taken. In lung surgery he employs no pressure apparatus; in œsophagus and mediastinum surgery he does.

DELANGLADE (Marseilles) also recommends radioscopy.

CECI (Pisa) read an account of interesting cases.

POTHÉRAT (Paris) reported a case of tetragenous abscess of lung among five other cases of lung abscess.

GARRÈ protested against such surgery as Tuffier has recommended, which contradicts our knowledge of pathologic processes. He asks Dr. Tuffier to explain his operation from a pathologic standpoint.

DR. SCHUMACHER reads the paper of Sauerbruch (Zurich) on Bronchiectasis, in which he recommends operative procedures in pronounced cases.

FIFTH DAY.

(1) *Surgery of tuberculosis of the lung.* FRIEDRICH (Marburg) gave a highly interesting account of his entire work on lung surgery in tuberculosis comprising 29 cases with 8 deaths and 21 cures, some of them operated four years ago. He advocates extensive extrapleural resection of rib eventually in several sittings, in patients where only one lung is affected or the other not too extensively affected, of ages between 15 and 40. He recommends putting the patient after the operation in inclined position, to prevent pressure against the diaphragm. He selects such cases which show by drawn-in apex that the lung has a tendency to shrink. He predicts great progress by this method.

POWERS (Denver) is entirely in favor of Friedrich's principle, mentions a modification of Wilms and speaks of the mortality as a negligible factor, considering the hopelessness of such cases by medicinal treatment.

DELAJENIÈRE (Le Mans) mentions cases of lung tuberculosis operated upon.

SCHUMACHER (for Sauerbruch) is in favor of gradual removal of the ribs in several sittings.

(2) *Colitis acuta.* Reported by SONNENBURG (Berlin). He brings some very interesting bismuth radiographs made by Max Cohn, which show mechanical obstructions in the flexurs lianalis as cause of colitis.

Chronic colitis. GIBSON (New York) in beautiful French gives an account of his interesting work in colitis chronica, for which he recommends an operation similar to the Kaders gastrostomy, which allows irrigation of colon. He cured a number of cases in this manner.

DR. ARCHIE POWERS (London) and SEGOND (Paris) favor appendicostomy, and the latter in a long and logical discussion speaks against all extensive operations, particularly ileosigmoidostomies in such conditions.

KOERTE uses in light forms lavage and ipecacuanha opiate and in severer forms an operation which is analogous to Witzel's gastrostomy fistula.

DR. DE QUERVAIN (Basle) puts down strict indications for treatment of colitis, but does not reject the more serious operations for the very severe cases.

In making a résumé of the work of the Congress, I say that, although there was nothing startling in the discussions they brought out the present status and most modern views on the surgical problems and brought them nearer to settling mooted points.

CHICAGO GYNECOLOGICAL SOCIETY

REGULAR MEETING, MAY 19, 1911, THE PRESIDENT, DR. GUSTAV KOLISCHER, IN THE CHAIR

DR. CHARLES E. PADDOCK read a paper on "Acute Edema of Cervix in Pregnancy," which appears in this issue. (See p. 40.)

DISCUSSION

DR. W. B. FEHRING: Was your patient nervous generally?

DR. PADDOCK: Not at all, until labor began, when it was almost impossible to do anything with her.

DR. FEHRING: Was there any relation to the so-called angioneurotic edema?

DR. PADDOCK: No. She never had any edematous lesions in any other part of the body.

DR. T. J. WATKINS: Was there any trouble after delivery?

DR. PADDOCK: None.

DR. WATKINS: I had a case where, during the second pregnancy, the woman had edema of the cervix. She had to lie down with her hips elevated in order to restore the position of the cervix. She suffered from much pelvic distress when on her feet. I never saw a case with so many symptoms and so little apparent pelvic injury. The muscles were quite intact. There was some general relaxation. She was not neurotic. After an extensive perineorrhaphy the symptoms disappeared and she has remained well.

DR. EMIL RIES: As a type of edema ex vacuo, we should expect such an edema when we use the Bier treatment on the cervix. I have used the pump in a number of cases, and have observed the condition of the cervix for half an hour at a time, with aspiration kept up intermittently or continuously, and I have never seen edema of any degree. There is a slight blue color, and when the cervix is eroded there is a little hæmorrhage. The mucus flows out freely from the cervix. Of course, these observations were not made on pregnant women. It is hard for me to imagine what disturbance in the circulation of the cervix could be so great as to produce edema. The cervix has so many veins and arteries, and they anastomose so freely that it is hard to conceive that such extensive edema could be produced by any obstruction to the circulation and then could disappear so quickly.

DR. CHARLES B. REED: If an acute edema would occur early in pregnancy, before the fourth month, there might arise a confusion in diagnosis between this condition and a retroflexed and incarcerated pregnant uterus.

DR. PHILIP S. DOANE presented a paper on "Cardiac Changes Secondary to Uterine Myomata." (See p. 42.)

DISCUSSION

DR. J. T. WATKINS: The point mentioned by Dr. Doane about doing a myomectomy on women under forty ought to be modified somewhat. I am doing fewer of these operations to-day than before. If a woman gives a history of gonorrhœa, one is not apt to do a myomectomy. If a woman has been married a number of years, and had no children, or if a woman has had a large number of children, I do not do a myomectomy. First, because other fibroids may develop; second, I may overlook one or more very small fibroids, which will develop later; third, the results are apt to be smoother after hysterectomy than after myomectomy, and the permanent results are better. There is less danger of exudates forming. I have only twice had to do a second operation for fibroid where I did a myomectomy first. I have had reason to suspect that some of these patients did have toxæmias and fibroids, and yet the evidence which I have been able to get would not entitle me to have more than a suspicion. I recall one case of suspicious toxæmia. The woman was unmarried, thirty-five years of age. She felt perfectly well, although her friends said her health was much below normal. She was kept under observation, with good general care, for about nine months, when we decided to do a hysterectomy. Her general health was much improved afterward, and she often said that she had not realized how much this tumor had affected her health.

I have not seen many cases of cardiac affections in fibroids. Perhaps I have overlooked that the pelvic disease has prevented these women from taking as much exercise as they would otherwise, which might help to develop cardiac disease.

DR. W. B. FEHRING: I want to ask Dr. Doane whether he found that there is a toxin eliminated in cases of fibromyoma of the uterus. I do not believe that such a thing has been found or demonstrated with reasonable accuracy.

As to the frequency of these tumors, I think we place too little importance on the significance

of the element of coincidence. Take a series of cases like Webster's 210, and there is not a much greater percentage of cardiac disturbances than would be found in 210 women taken at random and suffering from other diseases at the same period of life. Some of these women are in middle life.

Another point is that we rarely know whether or not the patient had heart disease before the fibromyoma developed. Many of them probably have, because it is surely true that cardiac disease occurs fully as often in women who are free from fibromyoma of the uterus as in those who have such tumors. In some of the cases mentioned, like Harvey's, nothing was known of the patient's earlier history — so that it is possible that she might have had a cardiac disturbance before. Then, again, there are many cases of fibromyoma in which there is no cardiac disturbance.

DR. C. B. REED: I had hoped that Dr. Doane would go more extensively into the etiology of this question, or at least give us a basis of ratiocination. If we take a nearly parallel condition from the organic standpoint, as, for instance, that of pregnancy, we see good grounds, theoretically, why disturbance in the heart should follow the interference with the circulation which such a mass in the pelvis could produce. The intra-abdominal pressure greatly increases and there is a definite mechanical interference with the return circulation, which means additional work for the heart, in order to overcome the resistance, and, naturally, one would expect to find changes in the heart. We know that within certain limits an increase in function causes hypertrophy and, if carried to excess, it produces an atrophy, and that other changes should follow seems plausible. In fact, in the presence of a myoma of large size it seems plausible that we should find at least lesions in the heart such as we find in pregnancy, and that such changes occur in pregnancy has been maintained by many for years. If we consider this from the mechanical standpoint alone, it will be seen that there are certain reasons which would justify us in considering the heart lesions as dependent on and consecutive to the changes in the uterus. But may it not be possible that there is a third something, a toxin, perhaps, which is the cause of all the changes which take place, not only in the uterus (not in the myoma), but also in the heart and blood-vessels? I mean degenerative changes. Is it not possible that there is a toxin due to disturbed metabolism which is responsible for all the changes in heart, uterus, and fibromyoma?

In conformity with this I might refer to a series of thirty-eight cases of cardiac trouble reported by Dr. Bayard Holmes, which have been mostly cured; that is, the symptoms have been to a great extent relieved by operations on the gall-bladder. Might not the opening and draining of the gall-bladder, and the occasional removal of stones, suggest a parallelism? Dr. Doane stated in his report that the heart lesions were improved after the removal of the myoma, but in not all the cases did the symptoms disappear entirely. Now, it seems to me that the findings would bear out the theory that possibly the lesions in both organs are due to a common cause, rather than that one is dependent on the other?

DR. GUSTAV KOLISCHER: So far as I know, in all statistics concerning combination of cardiac disturbance and myomata, the authors who claim connection between the two always mention that they believe that only those cardiac changes are due to myomata which involve the muscle of the heart. Most of them are cases of brown atrophy. I do not think it is very plausible that in all the cases reported the degeneration is myocardial. Brown atrophy of the heart is not a frequent occurrence. I do not think that the same factors can be efficient for causing brown atrophy of the heart, because we certainly should find that the myomata should degenerate in the same way as the heart muscle, and we often find brown atrophy of the heart without any sign of degeneration of the myoma.

DR. P. S. DOANE (closing): Dr. Watkins spoke of not performing myomectomy during the child-bearing period, preferring to do a hysterectomy especially in those women infected with gonorrhœa. This type is not to be classed as being a desirable child-bearing woman and hysterectomy is preferable.

Dr. Fehring's remarks are good. No work has been done on the subject of the toxins of myoma but there are many reasons for believing that there is a relationship between these toxins and heart disturbances.

Dr. Reed said that pregnancy does not, as a rule, cause disturbances of the heart. If myomata cause a mechanical disturbance of the circulation, pregnancy will affect the heart similarly. We know that removal of a myoma relieves the patient to a marked degree. The heart is not cured, but the symptoms are relieved, hence we are led to believe that it was a chemical rather than a mechanical disturbance.

The etiology of this is apparently unknown. It has not been worked out and it is difficult to work out. Modern physiological chemistry will doubtless solve the problem and show that a

toxin does produce these changes in the heart muscle.

DR. HERBERT MARION STOWE read a paper on "A Study of and Deductions from Fifty Fatal Cases of Puerperal Sepsis." (See p. 20.)

DISCUSSION

DR. C. S. BACON: Is it worth while to distinguish between local and general infections, calling the latter septicæmia? As I understood the author, he includes all local infections, which give rise to temperature, in his series. All genital wound infections giving rise to temperature are included. Whether we shall call all those septicæmia is a question. Should we not make a distinction between general and local infections?

The only way we can make a diagnosis would be by a blood culture, although blood cultures are not certain. It makes much difference who makes the culture. Not many can say with positiveness whether there is or is not a blood infection. It seems to me that in cases that are at all serious this should be done.

The next step is to determine the nature of the infection — whether we are dealing with a hemolytic streptococcus, or some other variety.

Then there is the question in regard to the difference between sapræmias and septicæmias. I think we are agreed that it is difficult to make such a distinction. It certainly cannot be made from the clinical symptoms. Very often there are foul discharges, indicating sapræmia, where there is infection with streptococci or other pathologic organisms.

I think that the result of such papers as Dr. Watkins read a year or two ago, and others in the literature, shows that non-interference generally leads to the best results. Drainage is the essential thing, and in cases of uterus infections this is secured by getting the uterus to contract, and by the Fowler position. The worth of cathartics lies not only in their eliminating action, but probably in a massage effect. When lochia is absent, massage externally, and soon there is a profuse discharge. Uterine contractions are started. Give internal massage by the use of cathartics and you probably get the same result. The amount of force exerted by the intestines must be considerable, and that, it seems to me, is one of the ways cathartics act.

However, there are cases where debris is left in the uterus that is not easily removed, especially in cases of abortion. It is not well to speak of decidua being retained, that is always the case. It is not that that we care about — but the remains of the placenta. If there is a considerable amount of placenta left in the uterus, with some membrane, why should not that be removed? If it is possible to effect removal with the finger, that is certainly the better method, but there are cases where these placental remnants can be removed more easily, and more safely, with the curette than with the finger.

The curette must be used with a great deal of care. Its danger is evident to all.

Where the infection extends beyond the uterus into the peritoneum, and there is a general peritonitis, it is a question of interest whether the injection of sterile oil into the peritoneal cavity may yield good results. The reports made in the past year or two are promising of good results.

For the general septicæmia it cannot be emphasized too much that saving the patient's strength is of the utmost importance, and where we have a long period of illness to look forward to, we should feed the patient with the greatest care. That means very frequently rectal feeding.

I do not think that rectal feeding is ordinarily managed properly. There is only one food which we can give by rectum for any length of time that is of value, and that is alcohol. The foods that need digestion cannot be so given. They disturb the rectum Alcohol, in properly regulated doses — 50 to 100 grams a day — furnish from 300 to 700 calories, and will tide over the dangerous stage. It has often been condemned as being harmful in these cases. No doubt it is — if given in enormous quantities — but in small doses it is useful.

DR. ROBERT T. GILLMORE: I am inclined not to agree with Dr. Stowe in his view as to the value of blood cultures. In all cases where I have had them made they have been extremely satisfactory.

As to treatment, the drainage he recommends after the uterus is clean is practically the only safe way of keeping the parturient tract clean. It is dangerous to give douches of any kind.

As to the use of antistreptococcus serum; unless the autogenous serum is used, it is probably of little value. This can be obtained from the blood cultures with comparative ease, and if given properly offers some hope in a general septicæmia. Give an initial dose of fifty million and wait for the reaction to subside three or four days. Then give one hundred million every other day for four times — increasing the number one hundred million until 400,000,000 are given, in the meantime watching the blood to note the effect on the leucocytosis.

It is useless to give any vaccines if no leucocyto-

sis is secured. Then some other method should be used to get a leucocytosis. Cold bathing — as it is given in typhoid — is a good method to use, or the injection of nuclein, twenty to forty minims twice a day.

Extraperitoneal drainage when there is a pelvic abscess is preferably by the vaginal route and if the pelvic does not clear up a radical operation after the symptoms and leucocyte count indicate that the pus is sterile.

DR. RUDOLPH W. HOLMES: I know of only one woman who had a criminal abortion done after any sort of preparation. It was done in a physician's office, and he had closely clipped the vulva. In the years that I was actively working with the Committee on Abortion, and when I was at the Cook County Hospital, I never saw a woman who had a criminal abortion who gave any evidence that anyone had made any preparation except those women who died in some of the best hospitals, and whose cases came to the Coroner's notice. I am firmly convinced that Dr. Watkins is right when he contends that no one ever thoroughly curetted a uterus. There are tracks and furrows in the endometrium, but it is not entirely removed. The expectant treatment should be talked about in and out of season.

CHICAGO GYNECOLOGICAL SOCIETY

REGULAR MEETING, JUNE 16, 1911, THE PRESIDENT, DR. G. KOLISCHER IN THE CHAIR

DR. THOMAS J. WATKINS presented a paper on "Puerperal Infection," which is published in this issue. (See p. 31.)

Discussion of papers by Dr. Stowe (read at May meeting), and Dr. Watkins.

DR. EMIL RIES: I desire to congratulate myself on the fact that after over ten years of my constant fighting for these principles, largely against general opinion in this city, and in strong opposition to opinions expressed in this Society, these principles seem to last to become recognized. When I at first entered this Society, curettement of the puerperally infected uterus was the treatment, and some of you may remember how severely I was criticized because I said I would not enter a puerperal uterus, except for a dangerous hæmorrhage.

Times have changed. Dr. Watkins and Dr. Stowe both say that the puerperal uterus should be disturbed only for hæmorrhage. That is the correct principle, and it holds as good for the puerperal uterus as for any other infected wound. These principles are the outcome of the application of our knowledge of what infection means and what means the body possesses for overcoming the infection.

It is rather sad that gynecology and obstetrics, the two sciences which marched ahead of the rest of surgery when it came to the introduction of asepsis and the abandonment of antisepsis of the operative wounds, should have been so slow to carry these absolutely correct principles into the treatment of puerperal sepsis.

Obstetrics has known for a long time that puerperal sepsis is no different from other sepsis, except in the gate of infection. There is no difference whatever, whether the infection has invaded the body by way of the genital tract or by way of a Fourth-of-July wound, or any other kind of injury, once the germs have invaded the body.

Since we know that we are absolutely unable to reach these germs in the living body by any antiseptics, we should not try to cure infection by any local treatment of the sexual tract. I need not go into the theories of infection and immunization. Suffice it to say that in general surgery the modern treatment of wounds has done away with antiseptics entirely. All we can do is to fortify the body in its struggle against the germs.

The methods Dr. Watkins mentioned are an application of what we use generally in the treatment of any infectious disease. We have long abandoned all hope of combatting by antiseptics the pneumococcus or the typhoid germ in the body. We have prophylactic treatment, but none against the germ once it has invaded the body. All we can do is to nurse, to feed, to keep comfortable. But we are not treating the infection when we carry out this treatment.

Let us consider some special points mentioned by Dr. Watkins. Raising the head to secure better drainage. The germs do not go by gravity. Living organisms grow by laws besides those of gravity. It does not make any difference whether the body is kept at an angle of forty-five or of

ninety degrees. The ice-bag to the head to relieve pain! By all means. Fresh air, good food, rest, etc., are all excellent means of *nursing* the patient, but are not *treatment* of the sepsis. It is important to be clear about this point, so that we will not forget that we are still absolutely impotent in the face of a serious infection.

Dr. Watkins mentioned that his cases had a duration of about three weeks on the average. That shows very clearly that this result was not the effect of the treatment. I should say that they were mild cases. A severe case of pyæmia would last two or three months and longer. No amount of conservative treatment of the kind employed by Dr. Watkins would have shortened them any. I have no doubt that cases of pyæmia can be made to last longer by interference. I have seen such cases repeatedly.

One of the most interesting cases of the kind was a woman who had a daily chill and whose physician irrigated the uterus with antiseptic solutions regularly every day. Regularly every day, in spite of the injections, she had a chill. I examined the woman, but found only a slightly thickened broad ligament. I advised to discontinue the intrauterine douches, and the woman had no more chills, but made a prompt and complete recovery.

The case shows that these treatments may make the case worse.

What interested me very much is the fact that Dr. Watkins does not even open the exudates. I do not doubt that that is good treatment in a number of cases, but I find it impossible in my own practice to pick out the cases where it would be right.

If you have an exudate or abscess in the pelvis, in the cul-de-sac, tube, or ovary, it is impossible to tell whether absorption will take place on perforation into one of the neighboring organs. After perforation occurs, the case would be of greater seriousness, harder to cure, than if we opened the abscess and allowed the pus to escape through the vagina.

I would like to know whether Dr. Watkins has means of determining which cases should be allowed to go on or whether he simply watches those cases from day to day and allows the pus to perforate knowingly and intentionally. I am perfectly clear about the point that as soon as we open the abscess and allow the pus to escape, the temperature, as a rule, drops and there is no further trouble.

It seems to me that in a large number of these cases the active process has come to a standstill, and we merely remove the product of the infection which the body has in reality overcome, so that we do not cure the infection, but take away the deposit of toxic material which keeps up the temperature.

I should be inclined to be a little more active than Dr. Watkins in the treatment of these abscesses. If a woman comes to the hospital with a case of puerperal sepsis, and I feel a thickening of the appendages or an indefinite mass in the cul-de-sac, I do not operate. I do not believe in the treatment Pryor advised some ten years ago. I am sure it does not shorten the course of the disease. I have tried it in some cases, over twenty years ago and was disappointed. When, however, I feel a fluctuating mass low in the pelvis, I do not wait for it to become absorbed, but incise at the point where I can get at it with the least difficulty and with the least danger.

I hope Dr. Watkins will tell us some more about what cases should be operated, and which ones should be treated conservatively.

Dr. Robert J. Gay: I have seen Dr. Watkins work. I was his interne for two years. In 1904 I reported a case of puerperal sepsis from Dr. Carey's service, with numerous complications, recovering without operation. It seems futile to do any destructive work in the puerperal pelvis under septic conditions. Where there has been much trauma in addition to the sepsis, all the patients die. Exudates will disappear in a remarkable way if you leave them alone. It is wonderful what absorption will take place. There will be adhesions, but not so bad as after operation.

In contrast to Dr. Stowe's mortality report of Cook County patients, Dr. Watkins has an astonishingly small mortality, and the proof of the value of any treatment is the results you get. People are getting well and are not incapacitated for future work by this treatment. It is worth while at least to keep out of the pelvis in these puerperal septic cases. Dr. Watkins deserves much credit for this work. He began to call attention to his methods three years ago, although Carey, I think, did the same thing much earlier.

Dr. M. T. Goldstine: I have had considerable experience with puerperal infections. My first work was done in Dublin and the treatment was active in every sense of the word. As soon as the temperature went over 100.8°, the rule was to curette and douche with creolin, one to three gallons. If the temperature did not go down in a few days, we did a second curettement and douching and packed the uterus with iodoform gauze. This was continued until the patient either got well or died.

We tried to be as scientific as we could. In every case the lochia and scrapings from the interior of the uterus were examined, but the treatment was always the same, no matter what the germ was.

I read a paper before the Chicago Medical Society about nine years ago, and reported over fifty cases, with a mortality of ten per cent. Dr. Ries discussed the paper and congratulated me that all the patients did not die. Dr. Watkins did not say anything. After that I did not treat another case actively because I wanted to find out what there was in the conservative treatment of puerperal sepsis. I have treated those cases in that manner ever since, and with good result.

Our cases in Dublin, most of them, were in the hospital. The reason we did not have such a large mortality probably was that we curetted and douched early and the patients probably would not have given us any trouble anyway. The morbidity was from six weeks to four months. Leave these patients alone and they will be out of bed, I think, and convalescing, as in the ordinary puerperium.

I have become a strong advocate of the conservative treatment in these cases. Anyone who had my experience would believe as I do. I would not go into the uterus now in such cases, except for hæmorrhage. In a septic abortion case, if the placenta were in the uterus, I would leave it there, not even cleaning it out with my finger. If there is infection, even sapræmia, in taking out the membranes, the temperature will drop, but you are bound to stir up the trouble in some cases.

Dr. Kolischer told us a year ago that many septic patients die with a normal temperature. I have seen half a dozen deaths with the temperature about 99°, and a very rapid pulse. The cause of this is that the patient's resistance is so low that the temperature does not rise and they die practically with a normal temperature.

As regards the puerperal exudate: In Dublin, even if there was no fluctuation, the mass was treated actively, and I am firmly convinced that many of these exudates would have been absorbed if left alone. They turned into abscesses because of infections introduced from without. I think that nine times out of ten these puerperal exudates will clear up if left alone, no matter how large they are.

I had a case where there was only a space six inches wide above the umbilicus to the ensiform that was free from exudate, and it entirely cleared up and the woman has had a child since. I have examined her and there is no thickening or anything in the broad ligaments. So that personally I leave these exudates alone until I am positive that they are breaking down. If they become soft and break down, it is due to septic material from without.

DR FRANK CARY: I am heartily in accord with the non-interference treatment and have been for many years.

DR. G. KOLISCHER: We will arrive at a better understanding of the treatment of puerperal infection if we discriminate a little bit more. The terms septicæmia, puerperal sepsis, and puerperal infection are not discriminations. Almost thirty years ago Carl Braun began active interference in these cases. In those days there was absolutely no differential diagnosis made between swelling of the appendages and infection in the tissues. Everything was called parametritis. However, Braun found out that very large abscesses may be absorbed and that after this there were secondary changes, such as the formation of adhesions and involvement of the bladder. He decided to take more active steps to prevent these secondary changes. Then he began to curette the puerperal uterus. At first the treatment was received with much enthusiasm. If you get these cases early and curette many uteri, many of the patients will recover in spite of the treatment. After a while this enthusiasm stopped. Ries was the first to call attention to the fact that what was curetted from the uterus was practically nothing but the raw surface at the site of the placenta, and that was presented as evidence how necessary it was to curette the uterus.

Then Schauta and Chiari showed that in consequence of this curettement the wall of defense which nature had built up was broken down and infection carried in. There are two kinds of infection: One a general infection of the whole system, when the germs are invading all of the tissues. That, however, may be limited to a certain extent. If we get a general involvement, the excretory organs are involved and also the heart. This is usually called sepsis. There is another class of cases where the infection is confined to the immediate neighborhood of the uterus — the parametritic tissue. You find in these cases that when you incise the mass you get into a lot of soft, mushy tissue, but not into a big cavity. If such cases come to postmortem, the cellular tissue is found to be studded with miliary abscesses, and in such cases, if the exudate is absorbed, as it is in some instances, these women show secondary changes, such as adhesions around the uterus, bladder, and ureters.

The experience in the Vienna clinics was that if we incised such exudates and cleaned them out, we prevented the formation of adhesions, and I cannot see any reason why we should not do so. If we find a phlegmon anywhere in the body we incise it, clean it out, and the recovery is a rapid one. Therefore, why should not the same thing be done when the infection is in the female pelvis? When there is a general infection of the system, such a course is useless, even when we scrape out the uterus or open the cul-de-sac and pack it with gauze. That is silly. Nobody believes that any more.

If the infection has died out, so far as the general system is concerned, and there are the remains of the infection, such as infiltration of the tissues and a large abscess, why should we not incise and drain? I do not think that any man can quote a case of parametritic exudate or abscess that was not benefited by incision and drainage. It is necessary, however, to make this distinction: A localized infiltration and general septicæmia or sapræmia are different conditions. We must make this distinction and then we can benefit our patients. If we find an absolutely immovable tumor and the uterus is fixed, and the tumor is inside the broad ligament, we should incise, and I incise whether the tumor is hard or fluctuating. I cannot see any use in waiting. Why wait six months when the abscess may be opened and drained and the patient be on the road to recovery in a week? Then, too, these abscesses will perforate and nobody can tell when they will do so. While I absolutely approve of the conservative standpoint, so far as general infection is concerned, I can see no reason why we should not incise and drain an abscess located in the parametritic tissues.

Dr. H. M. Stowe (closing on his part): It is very important to make a differential diagnosis between septicæmia and sapræmia — the mild and the severe cases. In the cases I reported last month, all seriously infected cases, eight patients died in eight hours, twenty-two in forty-eight hours, and forty-two during the first week. These were almost all cases of septicæmia. They were not of the mild type. It is easy after three or four days to differentiate between septicæmia and sapræmia. Of course, the patient may have both, but in septicæmia the sapræmia is only a minor complication. There is a profuse lochial discharge of a characteristic odor, with a slight elevation of temperature, pulse rapid, but slight constitutional symptoms. These patients almost all get well, if we treat them expectantly. It is important that we should not do a secondary operation. If a case of sapræmia is left alone the patient will get well. Few of these cases spontaneously result in a septicæmia. This usually follows some intrauterine manipulation. In septicæmia we have a different picture. There is a toxæmia; the pulse is rapid and thready; the temperature is low or normal. There is the characteristic facies, and rapid loss of strength, with vomiting, diarrhœa, and peritonitis. These are the serious cases, and they are easily differentiated from those of ordinary sapræmia.

As to the use of cathartics in puerperal sepsis, and their value as a means of massage, I believe they are valuable in the milder forms of the disease. In cases of peritonitis they often do not act at all. That is characteristic. Drugs help in the absence of peritonitis, but not when it is present. It should be a routine in every case to examine the placenta at the end of the third stage. If parts of it are missing, go in after them, but when there is sepsis do not do anything toward removing these remains until the acute stage of the sepsis is past, except in the presence of bleeding. It is important to conserve the strength of the patient. In the severe cases of septicæmia this is a difficult thing to do. Alcohol and heart stimulants are valuable, but they do not cure these cases.

How does Dr. Watkins get these patients to sleep eight hours a day? I find it difficult to do this, even with morphine. Sleeplessness is one of the characteristics of septicæmia. The patient cannot sleep. She vomits and retches continually. You cannot feed her satisfactorily and that is the reason she loses strength and wastes away so rapidly.

As to the value of blood cultures. I have seen three or four patients who have died without showing streptococci in the blood. The cultures were made three or four times by competent men and were always negative.

Laschko, and others, have reported cases where no streptococci were found. They may be located in the broad ligaments and their toxins are taken up by the lymph stream and blood. The patient is prostrated and dies with a negative blood culture.

As to the vaccine therapy, we do not use that at the County Hospital. In the first place, it takes twenty-four hours to make a culture of streptococcus, and twenty-four hours more to make the vaccine. Twenty-two patients in the hospital died in the first forty-eight hours. If we give the vaccine at first, and wait for a fall in temperature and then give the vaccine every other day for eleven days, the patient will be

dead. I do not see how the injection of millions of bacteria can give any results in many of these cases. H. Schwartz, of St. Louis, says that while there is great hope for this treatment, it is not at present founded on any definite basis.

As for the leucocytosis, I have seen patients die when there was a rapidly rising leucocytosis. Other cases had a stationary count and still others a leukopenia. I cannot see how the introduction into the blood stream of a large number of young leucocytes can have any action, because they have no phagocytic powers, such as are possessed by the very strong and more mature cells.

Dr. T. J. Watkins (closing): There does not seem to be much difference of opinion here. Dr. Ries is to be congratulated for the early stand he took against curettage. I, too, was among the first to ridicule this absurd and dangerous procedure.

As regards drainage, I do not believe that bacteria run down hill any more than they do up hill, but I think there is a slight value in posture. Take a case of gonorrhœal endometritis. There is no sepsis and no fever because the toxins escape. If the infection invades the tubes, there is fever, because the toxins are absorbed. In puerperal fever there may be some escape of the toxins, but I believe that it is not a very important part of the treatment. The duration of the cases has been a great surprise to me. When I first looked up the sixty-one cases the stay in the hospital was so short that I was astounded. One patient remained nine weeks; three remained seven weeks; many remained three weeks and some only two weeks. And yet these are severe cases. The patients were sent to the hospital because an operation was supposed to be indicated, possibly because there was a fear that the patient was going to die. Mild cases are usually not sent to the hospital. I believe that conservative treatment has shortened the duration of these cases very much.

As for the removal of an acute ovarian abscess or of a pyosalpinx, even when this is done in a most cleanly manner, without the spilling of any pus, it does not cut short the duration of the infection. That, I think, means that the amount of infective material removed is relatively very small. Most of it is distributed throughout the tissues. In acute pyosalpinx the patient has a temperature for three weeks if you do not operate, and four or five weeks if you do. The operation reduces the patient's resistance and you do not remove enough bacteria to make much difference.

Dr. Ries asked for indications for operation when exudates are present. He answered that by stating that he would not operate as long as a patient is improving. No matter how large the exudate is, I would not operate if the patient is improving. If there is a bulging abscess, puncture it. In the last thirty cases we had there was only one pelvic abscess which we punctured. Abscesses that burrow and are apt to break into other organs are in all probability secondary colon bacillus infections, and it is rather astounding, considering the close contact between the abscess and the bowel, that these infections do not occur oftener. Material is continuous in these cases, and it would seem that one would get early immunity by opening these abscesses.

I would open a secondary colon bacillus infection.

Dr. Kolischer criticized his treatment severely when he said that these pelvic exudates are multiple or miliary abscesses. When one open the abdomen he often finds little abscesses in the walls of the tube — more often than in the lumen, and in the walls of the uterus and broad ligament. I would take it that that would be an objection Dr. Kolischer would have to incision and drainage, because he could not open all these abscesses and drain them.

If you incise an exudate you are almost sure to have a secondary infection. I object to opening these exudates because of the danger of such an infection. Then, too, the patient often has a sinus for a long time. If that be true, then opening and draining these exudates would increase rather than diminish the danger of adhesions following. One who examines women who have had puerperal infection, even when this is done through an abdominal incision, must be impressed with the greatest rarity of hæmorrhages following puerperal infection. They are so rare that it seems a conservative statement to make that a puerperal exudate is sure to almost disappear entirely by absorption, in the absence of a gonorrhœal infection.

I am very glad that Dr. Stowe spoke of sleep in these cases, because it tends to bring us a little closer together in the after treatment. If you will stop stimulating these patients, they will sleep. A patient who gets $\frac{1}{30}$ of strychnia three or four times a day does not sleep well. A patient who gets much whiskey or digitalis is also apt to sleep badly. These patients need rest, not a stimulation. They need sleep. On the days when strychnine was used regularly after laparotomy, patients were so restless that they could not stay in bed. On stopping the strychnine a change was often noticed. I cannot see how you can make a heart much stronger by whipping it.

As regards blood cultures, we have been making some and I am very much inclined to stop them. They distress the patient and it does not help the treatment any. It does not matter whether there is a streptococcus or a staphylococcus vaccine given them. If we must wait until these are made, the patient will not need them at all.

CHICAGO SURGICAL SOCIETY

ANNUAL MEETING—PRESIDENT'S ADDRESS BY JACOB FRANK, M. D.

As I am about to induct my successor into office and surrender the authority which you have temporarily vested in me, permit me at this time to express my appreciation of the honor you have conferred upon me and my thanks for your hearty co-operation, without which the administration could not have met with success.

Ours is an organization of whose achievements we can well be proud. We number among our members surgeons who rank with, if they do not outrank, the leaders of America in this all-important department of medical science. Yes, men who have achieved international fame in pioneer surgery. Papers have been read at our meetings that have attracted commanding attention in the leading medical journals of our day.

The clinical meetings inaugurated by our distinguished ex-president, Dr. Arthur D. Bevan, have been productive of much good — they have afforded splendid opportunity for interchange of ideas and observation of modern scientific surgery, and I trust that our society will continue to hold these clinics at frequent intervals.

The Chicago Surgical Society can well afford to congratulate itself on its accomplishments, but in the midst of our rejoicings, let us pause to consider anew our mission, our duty to the community, our patients, the hospital and one another, to the end that we may further progress in the field of our endeavor.

I believe the time has arrived, however, when a society such as ours should inaugurate a campaign for the betterment of surgical conditions in all hospitals. An enlightened and educated public is fast losing its dread of the hospital and its fear of the surgeon. All the more reason why we surgeons, in co-operation with the hospital authorities, should do all within our power to merit the confidence reposed in us.

It has taken years of diligent, painstaking surgery and the genius of our leaders to accomplish this. My thought tonight is that we ought to take some steps to safeguard this position and to protect the public whose confidence we have won by our integrity, and which we can only keep by insuring it against mediocre or inferior surgery in operating rooms of all our hospitals — private as well as public.

I believe major surgery should only be performed by men well qualified for this delicate and difficult task; that some means or method should be found for the granting of certificates or licenses to duly qualified surgeons, and that only the holders of such certificates or licenses should practice surgery. All too often medical men, men of good standing, attempt major operations which they are incapable of handling, owing to the fact that they have not specially fitted themselves for the occasion and the surprises and intricacies of the operating-table.

A general practitioner would not think of treating an eye or ear case, and would not hesitate to send his patient to these specialists, but this self-same man would straightway take his patient to the hospital for a major operation, without the thought of consulting or calling in the man who has specialized and is carefully trained in the technique of major surgery.

Just how this reform, which will redound so greatly to the benefit of the patient, the hospital and the surgeon, is to be brought about, I am not prepared to say. It is a vital subject which requires much thought and careful study. Whether these certificates should be issued by a society such as ours, after one or two years' practice under the guidance of a recognized surgeon or issued by the same authority that grants medical licenses, is a matter deserving most serious consideration.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF SURGERY

UNDER THE CHARGE OF

FREDERIC A. BESLEY, M. D.

GEORGE E. BEILBY, M. D. — WM. R. CUBBINS, M. D. — AIMÉ PAUL HEINECK, M. D.
J. S. EISENSTAEDT, M. D. — FREDERICK G. DYAS, M. D. — G. T. COURTENAY, M. D.
FRED C. ZAPFFE, M. D. — JAMES F. CHURCHILL, M. D. — B. J. O'NEILL, M. D.
ARTHUR B. EUSTACE, M. D. — JOHN A. WOLFER, M. D. — H. A. POTTS, M. D.

The Sensibility of the Alimentary Canal. A monograph by ARTHUR F. HERTZ, London, England, 1911.

This monograph may be regarded as a very valuable addition to medical literature. It records a number of personal observations the value of which cannot be overestimated. Nothing will give as adequate an idea of what this book contains as the conclusions with which the writer terminates it. These are:

1. The mucous membrane of the alimentary canal from the upper end of the œsophagus to the junction of the rectum with the anal canal is insensitive to tactile stimulation.

2. The mucous membrane of the œsophagus and the anal canal is sensitive to thermal stimulation, but that of the stomach and intestines is insensitive.

3. The mucous membrane of the œsophagus and stomach is insensitive to stimulation by dilute hydrochloric acid and dilute organic acids, and the rectum, but not the anal canal, is insensitive to stimulation by glycerine. Contact of alcohol with the mucous membrane of all parts of the alimentary canal gives rise to a sensation of heat.

4. The surface of gastric and intestinal ulcers is no more sensitive to tactile, thermal and chemical stimulation than the intact mucous membrane.

5. The sensation of fulness in the alimentary canal is due to a slow increase in the tension exerted on the fibres of its muscular coat; the adequate tension is constant for each segment, but the volume of contents necessary to produce this tension varies with the tone of the muscle fibres.

6. The sense of fulness in the rectum has a special character, by virtue of which it produces the call to defecation.

7. Hunger consists in a general sensation of malaise and weakness in the body as a whole and a local sensation of emptiness in the abdomen. The latter is due to the periodical motor activity of the stomach and intestines during the fasting, in which a condition of muscular hypertonus and nervous hyperexcitability exists.

8. The only immediate cause of true visceral pain is tension. This is exerted on the muscular coat of hollow organs and on the fibrous capsule of solid organs. The sensation of pain in the alimentary canal is due to a more rapid or greater increase in tension on the fibres of its muscular coat than that which constitutes the adequate stimulus for the sensation of fulness.

9. Pain, in diseases of the alimentary canal, is most frequently true visceral pain. It is sometimes due to spread of the disease to surrounding sensitive structures or to tension exerted on the peritoneal connexions. It may also be situated in the skin, muscles and connective tissues, to which it is referred from the segment of the central nervous system, which receives the afferent nerves from the affected organ.

10. Tenderness in diseases of the alimentary canal is most frequently due to hyperalgesia of the skin, voluntary muscles, and connective tissues supplied by the segment of the central nervous system, which receives the afferent nerves from the affected organ. It may also be due to the increase in tension within the organ produced by the external pressure giving rise to the adequate stimulus of visceral pain; this is rare in the stomach, but comparatively common in spasmodic conditions of the colon and in appendicitis. Lastly, it may be due to the spread of the disease to the parietal peritoneum.

11. Visceral sensibility is exaggerated by training in hypochondriasis and visceral and referred sensations are exaggerated by the irritable condition of the central nervous system in neurasthenia and anemia.

On the Division of the Posterior Spinal Nerve Roots: (I) for Pain, (II) for Visceral Crises, (III) for Spasm. R. J. GODLEE. *Proc. Roy. Soc.* (Surg. Sect.), 1911, iv.

Godlee reports his results on six cases and reviews the literature rather thoroughly. He summarizes his conclusions as follows:

1. For the relief of pain the operation of posterior nerve-root resection is a somewhat uncertain proceeding. Cases which present very great pain without any organic disease are often of a highly neurotic

temperament, and their pain seems to have an important psychical element, which is not relieved by the operation.

2. For the relief of visceral crises, the operation holds out the only prospect of radical cure which we know of at present. Only those cases of this kind are suitable in which all other means have failed to give relief, but, on the other hand, it is important not to wait until the patient has become debilitated by emaciation and morphia.

3. In cases of spasm associated with lesions of the pyramidal tract, the operation has its largest field of usefulness. Spasm is, in all these cases, definitely relieved, and if the pyramidal tract is not totally severed, a great improvement of motility results.

4. The operation causes definite chromatolysis of some of the motor cells in the anterior horn of the segments involved, and this is probably associated with the lessening of motor spasm.

5. By the use of adrenalin injections as a preliminary to the operation the procedure becomes an almost bloodless and speedy one.

6. There is no special shock associated with the division of the posterior nerve-roots.

7. It is better to perform the whole operation in one stage.

8. In dealing with the brachial roots it is best to do a hemilaminectomy.

9. The lumbo-sacral roots are best approached at their junction with the cord, rather than at their point of exit from the dura.

Tuberculin Treatment of Urogenital Tuberculosis (Zur Tuberkulinbehandlung der Urogenital Tuberkulose). ROBERT BACHRACH and FRIEDRICH NECKER. *Wien. klin. Wchnschr.*, 1911, xxiv, 1363.

This consists of a detailed report of eleven cases. Conclusions of the writers are as follows: 1. Operable tuberculosis of the kidney is not a subject for tuberculin treatment. 2. Early cases (positive bacillus findings without essential pus formation and without functional involvement of the kidneys) are characterized for tuberculin treatment until the occurrence of an indication for nephrectomy. 3. For nephrectomized tuberculosis in which disease collections in the urogenital tract or in other organs remain, tuberculin treatment seems to be of use. 4. The action of tuberculin is exerted in bettering the general condition and in weight increase. 5. The influencing of the disease collections in the sense of healing has not yet been recognized. 6. Tuberculin treatment should be carried out without reaction and therefore certainly without danger to the organism. 7. Inoperable cases are scarcely to be influenced by the use of tuberculin, but because of the lack of other therapeutic measures this treatment should be tried.

Resection of the Posterior Spinal Nerve Roots in the Treatment of Gastric Crises and Spastic Paralysis. PROFESSOR FOERSTER. *Proc. Roy. Soc.* (Surg. Sect.), 1911, iv.

The topic is taken up from two standpoints, the first in regard to the relief of gastric crises by resection of the posterior spinal nerve-roots. Of these the author had collected 28 cases. Of the 25 who survived the operation 23 were relieved for a shorter or longer period. In some cases the cessation of pain was not complete. This Foerster attributes to the fact that a sufficient number of nerve-roots had not been cut.

The next is taken up in regard to the relief of spastic paralysis. Of this affection there have been 81 cases with 9 deaths. Of these 81 cases 51 were cases of congenital spastic paraplegia or Little's disease. Of these five died, one was not benefited and the other 45 were successful. The other cases were distributed among various spastic disturbances, most of which were operated on with distinct benefit. The writer then reports four cases in detail, one of which had never been previously reported. His success was striking. He lays special stress upon the after treatment. Exercises are absolutely necessary to obtain results. The limbs must be placed in movable plaster splints in such positions as to correct previous deformities. Sometimes it is necessary to perform tenotomy or tenoplasty.

The Treatment of Tendo-vaginitis Crepitans with Fibrolysin (Zur Behandlung der Tendovaginitis crepitans mit Fibrolysin). E. G. OSER. *Wien. klin. Wochenschr.*, 1911, xxiv, 1530.

Twenty cases of tendo-vaginitis crepitans were treated with a single intramuscular injection of 0.2 grams of fibrolysin. Recovery was obtained on the average in three to four days. Other fluids so used (sodium chloride solution, ether, one per cent cocaine) gave no results (except that cocaine temporarily diminished the pain). By Bier's method the average time required for recovery was six to ten days. The fibrolysin probably acts by hydrolysis of the collagen, which is then carried off by the lymphatics. One to two hours after the injection there is some pain. After the dose given in these cases no further difficulty was experienced.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF OBSTETRICS

UNDER THE CHARGE OF

C. S. Bacon, M. D.
Heliodor Schiller, M. D.
Herbert Marion Stowe, M. D.
C. G. Grulee, M. D.

Gynecological Lesions in Relation to Suicidal Mania (Die gynäkologischen Läsionen bei der Manie des Selbstmordes und die gynäkologische Prophylaxe gegen den Selbstmord beim Weibe). Bossi. *Zentralblatt für Gynäkologie*, September 9, 1911.

Bossi believes that even slight alteration of the female genital apparatus may lead, at certain crises, to suicidal tendencies. He thinks that half of suicides in women arise from gynecological causes, especially at the times of puberty, the menstrual epochs, pregnancy, the puerperium, or the menopause. These different physiological episodes are not in themselves the causes of suicidal tendencies but are the immediate etiological factors in a predisposition which is brought to fruition through gynecological lesions

The author recites several cases which showed various predispositions to neuroses or psychoses and in which there were marked tendencies to the commission of suicide. These cases all had more or less gynecological lesions and were all cured or greatly improved after the lesions were successfully treated.

The tendency to self-destruction arises under different forms of uterine disorder, but it is difficult to figure out an approximate percentage for each variety. Bossi discovers a relatively greater tendency in those lesions which are intrinsically of less moment than in the more severe forms. For example, he finds suicidal tendencies very little marked in malignant neoplasms, especially the inoperable forms. Also he finds no great tendency to suicide in women afflicted with large cysts, large fibromyomata, and extensive and very painful adnexal diseases. He notes a frequent tendency in those suffering from chronic infections of the endometrium and myometrium. Retrodisplacements with chronic infection of the pelvis or with adhesions appear to be the most frequent causal factors. This he thinks is due to the chronic toxæmia acting upon the whole organism.

The tendency to self-destruction is manifested most distinctly at the catamenial period; a time when the woman's organism is most susceptible to nervous and psychic irritations. The congestion of the pelvic organs, due to the menstrual stimulation, intensifies the already existing gynecological lesions and sets off the psychical explosion. The congestion brings to the infectious process an increased nutrition and leads to an increase in the production of toxins. In patients with endometritis complicating retroflexions and other alterations of form of the uterus, the congestion of menstruation acts to close the canal and so dam back the secretions as in a closed abscess.

It is obvious that fifty per cent of suicides among women occur in the epochs of the physiological crises of the sexual life; namely, puberty, menstruation, puerperium, and menopause. These crises serve as the opportune causes in an individual who has a psychotic tendency and this tendency is increased by heredity, by different personal eccentricities, and by bad social and family surroundings.

He pleads for a closer union between neurologists and gynecologists in the study of individual cases of mental disorder among women.

Henry F. Lewis.

Pernicious Vomiting of Pregnancy; Pathogenesis and Treatment (Pathogenie et Traitment des Vomissements Incoercible de la Grossesse). M. G. Fieux. *Annales de Gyn. et d'Obstet.*, Nov. and Dec., 1910.

This paper was presented at the French National Congress of Gynecology, Obstetrics, and Pediatrics. The author believes that the vomiting of pregnancy, when of the incoercible type, is a specific one, not to be confused with any other vomiting. That it is an autointoxication is presumable from the tachycardia and the presence of a neuritis. Most theories already standing as etiological factors in hyperemesis are considered by the author, only to be found wanting in some particular. Thus the theory of the reflex, of the stretching of the uterus, of hysteria, etc., are shown to be untenable. Fundamentally, the fact that the condition ceases when gestation is terminated shows that it is due to the pregnant state. Fieux believes that the substance serving as the active principle is not only emetic but toxic. Hypotension is the condition seen early in gestation, hypertension that present in late pregnancy; thus the toxæmia at first is different from that nearer term. In early vomiting no hepatic insufficiency is evident by urinalysis, but later both urobilin and

acetone are decreased. The ovarian theory and that of the secretory activity of the corpus luteum is defective in that the corpus luteum is at its most active stage of development in early pregnancy. Hence treatment with ovarian and lutein extracts is ineffective.

In treatment, Fieux advises a milk-vegetable diet in the milder cases or early in the more severe. Electrotherapy, as employed by Larat and Gautier, is effective in certain cases and adrenalin in others. When these are ineffective and in the graver cases, interruption of pregnancy, as a last resort, is indicated. Here the essential is to avoid trauma and to evacuate the uterus with greatest dispatch. Hence the more conservative methods, as with the bougie or rubber bag, are preferable.

CAREY CULBERTSON.

The Effect of Pregnancy on Diabetes (Über die Einwirkung der Schwangerschaft auf die Zuckerkrankheit). DR. GUNNAR FORSSNER. *Nord. Med. Arkiv.*, 1911, afd. I. (Kirurgi) Festskrift for J. Berg, No. 35.

In the case observed by the writer, he states that he regards it as probable "that the interruption of the pregnancy had truly improved the metabolism in the sense that the formation of acetone bodies had been diminished."

After a thorough review of the literature, he decides that the observation so far has been insufficient so that any rules can be formulated as to the method of treatment in cases of diabetes complicated by pregnancy.

Post Partum Hemorrhage. A. VON REDING, F. FROMME AND M. W. SCHESTOPAL. *Zentralblatt für Gynäkologie*, September 16, 1911.

Von Reding: Since 1909 Momburg's method of treating puerperal hæmorrhage has been the regular procedure in the clinic in Zurich. If the bleeding is not controlled by ergotin and uterine massage, a hot uterine douche of one per cent salicylic acid solution is given. If hæmorrhage continues or returns, the abdominal tourniquet after the method of Momburg is applied. In cases of retained placenta or membranes or of cervical tears the uterus, after application of the tourniquet about the waist, is curetted or tamponed. In cases of extreme anæmia, the Momburg tourniquet is applied at once and the uterus is tamponed.

The elastic tube is kept on for ten or twelve minutes, but may be left on even longer without damage.

Of thirty cases good results were obtained in twenty-eight. Sixteen were cases of atony, twelve of placental retention, and two of cervical tears. The lack of bleeding from the genital region due to the application of the elastic tube allows a better opportunity for operative procedures and for application of sutures.

Usually the constriction is well borne; in three cases great pains in the legs were felt, but these were cases of extreme anæmia. In one instance, the efficacy of the constriction was so little that tamponade was necessary in addition. In one case of total placenta prævia, the hæmorrhage was large in spite of the constrictor as well as the tampon.

No harmful results were noted in any case. In three women thrombophlebitis occurred in the puerperium. The author recommends the procedure for the practicing physician but not for midwives.

Fromme recommends the Momburg constriction of the body very strongly for atonic hæmorrhage. He considers strong contraindications to be heart disease, arteriosclerosis, nephritis, and Basedow's disease. He advises that the blood be kept in the upper part of the body as much as possible by a preliminary tight bandaging of the legs before applying the elastic tube. If this is not done there is danger of syncope from too little blood within the heart's cavities and consequent failure of its action. This author also recommends the method for hæmorrhage in uterine rupture.

Schestopal reports three cases with good results. Two were simple atony and one atony with severe hæmorrhage from vaginal lacerations.

Missed Abortion and the Etiology of the Hemorrhages Accompanying this Condition (Über vermisste Abortus und die Aetiologie der diese begleitenden Blutungen). DR. ROSENSTEIN. *Monats. f. Geb. u. Gyn.*, b. xxxiii, h. 6.

After giving the histories of three cases of missed abortion, in which the diagnosis of the condition was very difficult as was also the differentiation as to whether dealing with a retention of the fœtus and the placenta or only a retention of the latter, the author gives the history of two other cases noteworthy on account of the severe hæmorrhage following the expulsion of the macerated fœtus and placenta. The second case terminated fatally and the histological examination of the uterus enabled the author to throw some light upon the etiology of these hæmorrhages.

A woman, 23 years old, II para, had menstruated last in June, 1909. In December her abdomen became smaller and in the middle of February a hæmorrhage set in. The author saw the patient the beginning of March and found the uterus to correspond with the fourth month of pregnancy. The diagnosis of missed abortion was made. The same evening pain set in, and fœtus and placenta were soon expelled, but the uterus remained soft. Massage, cornutin injections, renewed packings, Momburg, stimulants, nothing improved the condition, and the woman bled to death. The fœtus was 31 cm. long, the placenta hard, leathery, 10 cm. broad, 1½ cm. thick. At the postmortem the uterus was found 14 cm. long, its muscularis pale, the mucosa of the corpus and cervix eroded, the muscle of soft consistency. Microscopically near the seat of the placenta the vessels showed hyalin degeneration, no tunica media or adventitia were

recognizable; the walls of the vessels were a homogeneous mass, and at different places the syncytial cells were present. All elastic elements of the walls seemed missing, the vessels were collapsed like empty bags. Following the blood-vessels toward the muscularis, large layers of syncytial cells were present. In some places the whole vessel was transformed into tissue of syncytial character. Small round cell infiltration and extensive degeneration of the muscle cells were very distinct. This hyalin degeneration of the wall of the blood-vessels near the placenta and the absence of the elastic tissue of the vessels, according to the author, was the main cause of the hæmorrhage. Such conditions present, we learn in these cases not to wait too long before resorting to the *ultimum refugium* — the extirpation of the uterus as a life-saving operation.

HELIODOR SCHILLER.

Concerning Posterior Cervical Cæsarean Section

(Über Sectio cæsarea cervicalis posterior). POLANO. *Zentralblatt f. Gyn.*, No. 40, 1911.

Polano mentions two points of superiority of the extra-peritoneal Cæsarean section over the classical operation, namely, the shutting off of the peritoneal cavity, and the deep situation of the incision. There are, however, three unfavorable points, namely, the increased difficulties of technique, the much greater hemorrhage on account of the impossibility of compression, and the difficulty in delivering the child. The main point advanced by the advocates of the cervical Cæsarean section is that the peritoneal cavity is shut off from infection from the unclean amniotic fluid. On the other hand, because of the great difficulty in delivering the child, it often happens that the carefully sutured peritoneal layer is torn through and the amniotic fluid is allowed access to the peritoneal cavity. It is well known that the peritoneum will withstand a considerable amount of infection provided that the drainage of the cavity is thorough and that the further access to the cavity of infected secretion is prevented. Such is often observed in cases of fouling of the peritoneum during operations for appendicitis and for infected tubes. Therefore, in suspected or septic cases where Cæsarean section must be performed, it is well to provide for as good drainage as possible. For drainage of the peritoneal cavity through its deepest portion a posterior incision of the uterus is more favorable than one anterior.

Polano's operation consists in making a median incision in the abdomen, drawing the uterus out of the abdomen and bending it forwards over the symphysis as much as possible, making the uterine incision through the lower posterior surface of the uterus where the fetal presenting part is most prominent, and delivering the child through the wound. The term posterior cervical Cæsarean section is not strictly correct, inasmuch as the uterine incision is made not through the cervix alone but through the lower uterine segment as well. Polano performed his operation in four cases; one during pregnancy, one in the early stage of labor, both aseptic; one surely infected and one suspected.

His technique is as follows: He opens the abdomen, with the patient in Trendelenburg's posture, as in the classical operation; he tucks a soft towel into the abdominal cavity and far down into the cul de sac, shutting off the intestines; he partly approximates the upper angle of the abdominal wound with vulsella; covers the uterus with a soft towel, at the same time protecting its anterior surface from contact with the skin of the pubes; bending the uterus as far as possible forwards over the symphysis, he makes a sagittal incision posteriorly over the most marked presenting part of the fetus; if transverse presentation, over the deepest possible portion of the cervix; he delivers the child with the other hand and expresses the placenta. In clean cases he closes the uterine wound with double catgut sutures, leaving room for one or more rubber or glass drainage tubes or a rubber T tube. After carefully cleaning the abdomen with towels he closes the abdominal wound. The drain he allows to remain for five days. In some cases he recommends temporary clamping of the infundibulo-pelvic ligaments during the operation. All the women recovered and all the children except one, which died one day after birth with acute streptococcic infection.

HENRY F. LEWIS.

BOOK REVIEWS

GYNECOLOGICAL SURGERY. A Text-book by Comyns Berkeley, M. A., M. B., B. C., F. R. C. P., M. R. C. S., Gynecologist and Obstetrician to the Middlesex Hospital, etc., and Victor Bonney, M. S., M. D., B. Sc., F. R. C. S., M. R. C. P., Assistant Gynecologist and Obstetrician to the Middlesex Hospital, etc. London: Cassell and Company, Ltd., 1911.

This new work, concerned wholly with the operative side of gynecology, is based upon the author's own personal methods and experience acquired through service at the Middlesex and Chelsea Hospitals. It is further offered frankly as reflecting the practice of the school of gynecological surgery to which they belong. The plan has been to set forth in detail the indications for operations, the preoperative preparation, the operative technique, the postoperative treatment, and the dangers to be avoided, with the possible complications and their appropriate treatment.

In carrying out such a project the authors have not only met the obligations undertaken in the presentation of their subject matter but they have been most happy in the mechanical arrangement of the text itself. The type is large and very clear, the margins are generous, and broad-faced lettering marks the subheadings and paragraphs. Dr. Bonney's numerous drawings in outline are most helpful to a good understanding of the text. The plates in color are correct in drawing and are excellently produced.

The volume is opened with a short dissertation on general operative considerations, the second and third chapters being devoted to surgical technique, instrumentation, sterilization, sutures, dressings, drainage, and the technical management of the operating suite. The preoperative examination and preparation of the patient is clearly and concisely set forth, indeed so clearly that the occasional operator, who is not apt to have formulated directions, would do well to follow this chapter in total.

Operations on the external genitalia are first described and then those pertaining to the vagina. A flap-splitting method is described for perineoplasty in both the complete and incomplete lacerations. In all of this work, as in colporrhaphy, vesical fistula and plastic work on the cervix, silk is the suture material of choice. From a surgical point of view no better expression has been given to the distinction that should be made between the cervical and the corporeal mucous membranes of the uterus. The author's indications for currettage are, endometritis, mucous polypus, retained products of conception, membranous dysmenorrhœa, and for microscopical examination. While currettage for leucorrhœa is in question at present in America, granting this condition as indication, the author says: "To sum up, leucorrhœa per se is an indication for curettage of the cervix only. Abnormal hæmorrhage, pain, and uterine enlargement, though they may indicate corporeal endometritis, are much more likely to be due to some altered condition of the deeper parts of the uterine wall which a superficial denudation of the mucosa will not cure."

The further work done by vaginal section is given considerable description. This includes the operations for removal of the retained products of conception, of polypi of myomata, and hysterectomy This last operation is gone into at length, the indications and relative advantages and disadvantages being dilated upon. While the technique of the procedure is set forth conventionally, the difficulties besetting the complicated cases are carefully brought out. The paravaginal method, the bisection method, and the more radical hystero-vaginectomy are all explained in minute detail. This section is closed with the operation for vaginal fixation of the uterus.

The greater portion of the volume is occupied by descriptions of the various operations performed by the abdominal route. In addition to hysterectomy by the routine methods, Doyen's operation is described, as is Bonney's. The radical extirpation of Wertheim is favored in malignancy and is discussed at considerable length. The procedures in myomata on the other hand, are explained very briefly. In Cæsarean section, delivery of the uterus through the abdominal wound is decried, except where the uterine contents are septic, before removal of the child, but after the third stage it is delivered for the purpose of repairing the wound.

Resection of the fundus of the uterus, by removing a wedge-shaped portion thus forming a utriculus, is advocated in certain conditions attended by menorrhagia. The authors apply the term utriculoplasty to this procedure and describe it at length. Uterine ventro-suspension, as here set forth, appears to be a very excellent ventro-fixation, as this operation is performed in America; the procedure shown and condemned as ventro-fixation being seldom or never attempted with us. But one operation for shortening the round ligaments is mentioned, this being a modification of the well known Gilliam procedure. In extra-uterine gestation a point is well made in explaining the variations of the typical operation rendered necessary as the duration of pregnancy advances.

One of the most valuable chapters is that devoted to after treatment, wherein the postoperative care of the patient is entered into somewhat more fully than is usual in operative texts. Post-operative complications are also taken up fully. An effort, made to formulate a differentiation between shock and hæmorrhage, "because the distinction between them forms the most important problem in all the after treatment of abdominal sections."

In the treatment of hæmorrhage the important point is emphasized that saline infusion is not to be resorted to before the bleeding vessel is secured. Chapters on the immediate and the remote results of gynecological operations close the volume.

On the whole this work is an expression of genuine effort on the part of the authors. While the occasional operator will find the technical descriptions of great value, every experienced surgeon might well read and take to heart the first chapter on general operative considerations. "It falls to the lot of every surgeon, sooner or later to stand face to face with threatened disaster when operating and even among the best there must be moments when the heart sinks. On such occasions the operator should remember that if he does not hesitate, the deliberate and vigorous application of general surgical principles will always, temporarily at any rate, surmount the difficulty, whilst half-hearted and nervous measures merely increase it. A sturdy belief in his own powers and a refusal to accept defeat are the best assets of a calling which pre-eminently demands moral courage."

CAREY CULBERTSON.

THE AMERICAN PRACTICE OF SURGERY. Edited by Joseph D. Bryant, M. D., and Albert H. Buck, M. D. New York City: William Wood & Co., 1911.

The last volume of The American Practice of Surgery, edited by Joseph D. Bryant and Albert H. Buck, has been completed. This last volume, which is the eighth, is devoted to a consideration of the Regional Surgery of the Chest, Spleen, Diseases and Wounds of Kidneys and Ureters, Pancreas, Liver, Gall-Bladder and Biliary Passages, Diseases, Wounds and Malformations of the Urinary Bladder and Prostate, Ovaries and Fallopian Tubes, Uterus and Ligaments, Extra-Uterine Pregnancy, Cæsarean Section and its Substitutes.

Part XVIII of Volume VIII deals with Administrative Surgical Work covering Hospitals and Hospital Management, Military Surgery, Naval Surgery, and Railroad Surgery.

An appendix to this volume embraces the subject of The Relation of Blood Pressure to Surgery, and in addition contains a general index to all the volumes from I to VIII, which appears most complete and will, of course, be an invaluable aid in the use of the system.

Considering the work as a whole, we are impressed at once with its completeness and exhaustiveness, and representing, as it does, the opinions and writings of the best of American surgeons, it cannot fail to be of the greatest value to all teachers and students of the science and art of surgery. Beginning with Volume I, which considers in a broad way the general principles of surgery, the system follows a logical and consecutive plan in its arrangement of the writings on regional surgery. In looking over the list of authors in relation to the subjects upon which they have written, it would appear that the editors had exercised rare judgment in the selection of a writer for a given topic. Many chapters are complete monographs on the respective subjects.

The illustrations throughout the system are accurate and well executed. The paper, print, and binding probably excel anything of the kind that has ever been produced.

Too much cannot be said in commending the editors for their arduous labor in collecting so much valuable material on all subjects pertaining to the practice of surgery, and it should receive the appreciation and recognition of all American surgeons.

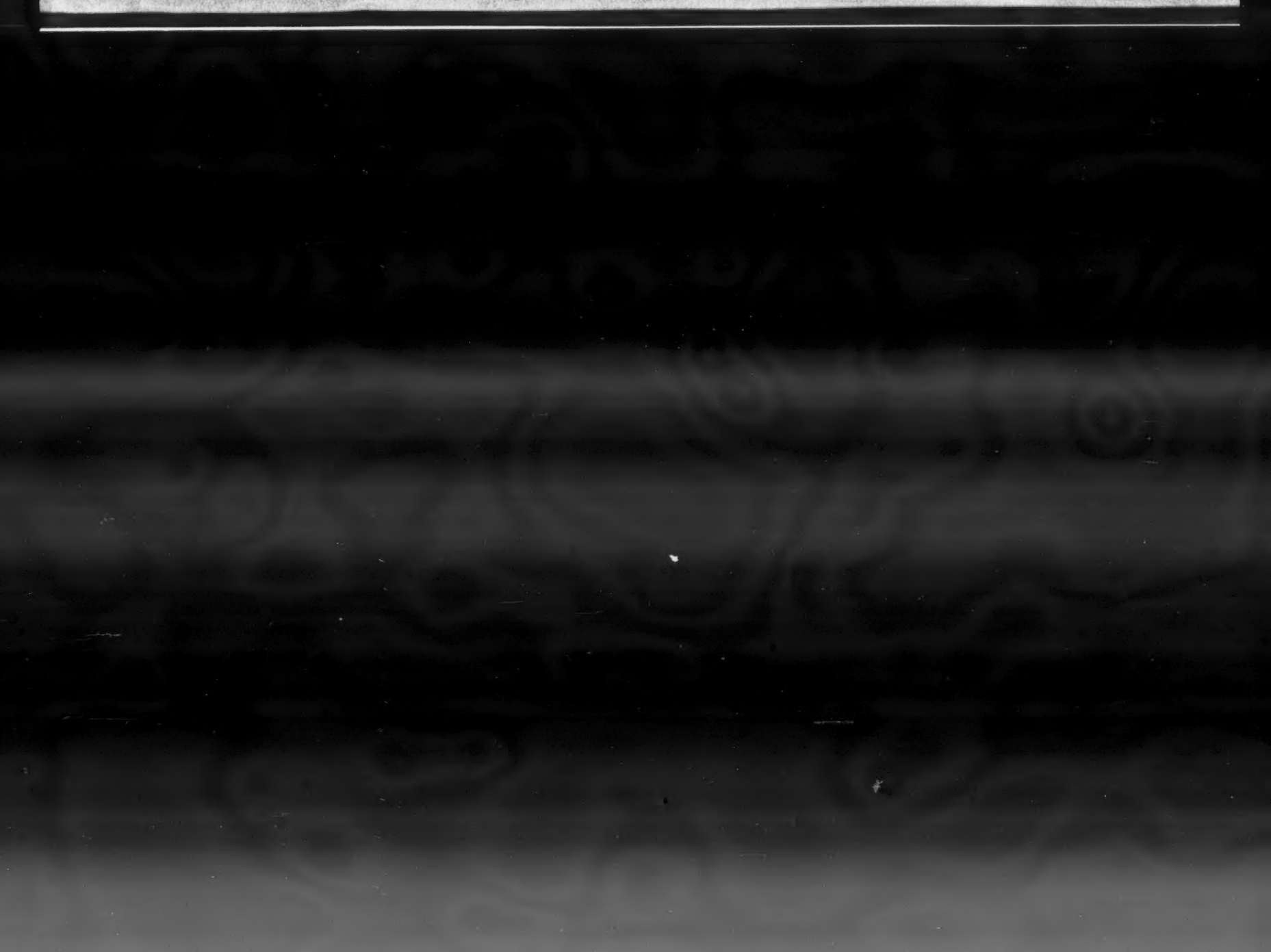
NOSTRUMS AND QUACKERY. Based on articles on the Nostrum Evil and Quackery published in the Journal of the American Medical Association. Chicago: American Medical Association.

The association has rendered a distinct service to the public at large, as well as to physicians, in compiling and publishing in book form the results of its investigations of the nostrum evil and of quackery in general. The book is a veritable "Who's Who" of present-day medical fakes and fakers, and, in addition, many of the lesser lights are given a passing word. Coming from the source they do, the articles bear the stamp of authority and give the physician definite and accurate information in handy form.

In addition the volume impresses us as a long step in the campaign of education of the public on medical subjects. The country is being flooded with newspaper, magazine and pamphlet advertising of quacks, of "cures" and of "cure-alls" with high sounding names, and the public can only be safeguarded against such things by information about them — and the information is all here. As the publishers say, a spade is called a spade, and it is a fairly safe venture that any intelligent layman, after looking through "Nostrums and Quackery" (and if he looks at it, he will read it — it is interesting reading) will be extremely wary of "cure-alls" and "cure-quicks" which come to his notice.

The volume is divided into three parts: I, Quackery; II, Nostrums; III, Miscellaneous.

The name of the physician is placed on the cover for twenty-five cents extra, making it a suitable volume for the reception room. J. F. C.



ANNUAL SUBSCRIPTION: UNITED STATES AND CANADA, $5.00; FOREIGN, $6.00 (25 SHILLINGS)

Volume XIV FEBRUARY, 1912 Number 2

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SURGEONS

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Entered as second-class matter June 29, 1905, at the postoffice at Chicago, Ill., under the Act of Congress March 3, 1897.

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